

The network imaginary: coherence and creativity within a multiscalar collaborative effort to reform US fire management

Bruce Evan Goldstein^{a*} and William Hale Butler^b

^a*P.O. Box 173364, Department of Planning and Design, College of Architecture and Planning, University of Colorado, Denver, CO 80217, USA;* ^b*Visiting Assistant Professor, Urban Affairs and Planning Program, School of Public and International Affairs, VirginiaTech, Blacksburg, Virginia, USA*

(Received 8 April 2008; final version received 21 March 2009)

In response to the ongoing crisis in fire management, the US Fire Learning Network (FLN) engages partners in collaborative, landscape-scale ecological fire restoration. The paper contends that the FLN employs technologies, planning guidelines and media to articulate an FLN imaginary that co-ordinates independent efforts to engage in ecological fire restoration work without need of either hierarchal authority or collective social capital. This imaginary may allow the FLN to draw on the creativity and adaptive innovation of collaboration to reform fire management institutions and fire-adapted ecosystems.

Keywords: social imaginary; collaboration; learning network; fire management; ecological restoration

1. Introduction

Four decades ago, fire scientists and managers embraced a dynamic perspective of natural fire regimes, and abandoned a commitment to wildfire suppression that had dominated US fire management policy and practice for almost a century (Pyne 2004). Yet, fire suppression continues to be reinforced through incentive structures, budgets, and professional practice (Arno and Allison-Bunnell 2002). With greater attention drawn to the fire crisis following the destructive fire season of 2000, The Nature Conservancy (TNC), in affiliation with the USDA Forest Service (USFS) and the Department of Interior (DOI), initiated the US Fire Learning Network (FLN) to collaboratively develop ecological fire restoration plans on landscapes with multiple jurisdictions and management organisations.

Within a multi-scale structure, the FLN utilises technologies, planning guidelines and various forms of media that shape, transmit and reinforce certain assumptions and expectations for engaging in collaborative ecological fire restoration planning and management. With such an extensive infrastructure, the FLN risks undermining collaborative creativity and innovation by prescribing interaction. This paper contends that rather than dictate specific practices and outcomes, these assumptions and expectations articulate a social imaginary (Taylor 2004) that co-ordinates

*Corresponding author. Email: brugomail@yahoo.com

site-based collaboratives without hierarchal authority or mutually supporting social relationships.

The paper begins by reviewing how place-based collaborative planning is responding to cross-scalar challenges. It is suggested that the concept of the 'social imaginary' may guide efforts to co-ordinate across multiple collaboratives without undermining their creativity and autonomy. After a methods overview, the paper describes how the FLN emerged in response to the fire management crisis. Next, the study specifies how FLN planning guidelines and technological protocols supported an FLN imaginary. Embodied in practice and communicated through publications and performances, the imaginary bound landscape collaborators to a coherent set of assumptions and expectations. Finally, the paper describes how the imaginary sustained a collaborative network, allowing the FLN to simultaneously promote learning and innovation within place-based collaboration while catalysing fire management's long-anticipated shift to ecological fire restoration.

2. Multi-scalar collaboration

Multi-stakeholder collaboration developed as a way to solve disputes that stymied regulatory agencies, representative assemblies and the courts (Gray 1989, Weber 1998). Critics have questioned whether collaborative agreements could be implemented within adversarial institutions in which disputes had originally festered (Amy 1987, Flyvbjerg 1998). Collaborative planning scholars have responded that deliberation could fundamentally alter adversarial relationships, permitting stakeholders to remain engaged with one another and implement the solutions they had devised (Healey 1997, Booher and Innes 2002). As scholars described how collaboration could bootstrap its own enabling conditions, this raised the possibility that collaboration could both yield just and lasting solutions to specific problems and could catalyse new institutional relationships that addressed root causes (Healey 1997, Innes and Booher 2000, Booher and Innes 2002). In 2005, collaborative planning researchers joined with deliberative democracy scholars and practitioners to envision creation of an 'ad-hocracy' (Menkel-Meadow 2005) made and remade through ongoing collaborative practice.

Unlike dispute resolution, an 'ad-hocracy' cannot simply be designed by matching the domain and scope of a collaborative process to a specific set of planning or policy objectives. While a collaborative may operate in a specific place where stakeholders can address specific disputes, an ad-hocracy integrates collaboratives across temporal, spatial and organisational scales, cumulatively reframing knowledge practices, assumptions, expectations and norms to accord more with collaborative, consensual decision making. Yet the spontaneous emergence of an ad-hocracy does not capture the full potential of collaborative processes. A deliberately co-ordinated network can integrate collaborative action to resolve collective problems at multiple locations and scales. A network in which participants work at different locations to address common issues can distribute innovation and resources while fostering the creation and maintenance of new participating sites. In total, a network of collaboratives may promote more fundamental change. Such a network of collaboratives is more ambitious than a dispute resolution process and more focused and deliberate than an 'ad-hocracy'.

Researchers have begun to consider emergent qualities of multi-sited co-ordinated collaboration (Margerum and Whittall 2004, Innes *et al.* 2007). Such co-ordinating

arrangements can link sites in ways that are coherent and mutually comprehensible, increasing prospects for institutional reform. However, co-ordinating collaboration may conflict with the autonomy that each collaborative requires to work effectively. An overly prescriptive approach can be counter-productive if it interferes with each site's capacity to come up with their own problem definitions, take into account local context and contingencies, and generate their own creative solutions (Gray 1989, Booher and Innes 2002). A productive balance must be struck between the openness required to foster innovation in place-based collaboratives and the coherence necessary to ensure that activities and knowledge generated at disparate sites are mutually comprehensible and supportive.

Collaborative planning scholars have yet to provide guidance on how to co-ordinate sites in ways that address this tension between cultivating creativity and innovation and ensuring coherence across sites. In their examination of informal collaborative processes dealing with regional water issues in central California, Innes *et al.* (2007) concluded that a remaining challenge both for the regional system and collaborative processes in general "... is to transform the ideas, informal relationships, and agreements into a more enduring form, without losing the flexibility and adaptiveness of what emerges from the informal system" (Innes *et al.* 2007, p 207).

The paper explores whether balancing the need for creativity, informality and flexibility at the site scale with coherence and comprehensibility at regional and national scales can be achieved through circulation of a common 'imaginary' among sites. Anderson (1983) proposed that the ties of nationality constitute an imagined community, stating that "... members of even the smallest nation will never know most of their fellow-members, meet them, or even hear of them, yet in the minds of each lives the image of their communion" (Anderson 1983, p. xxxi). The concept was expanded by Taylor (2002, 2004) who described a 'social imaginary' as a dispersed collective expectation of how things work now, how they are supposed to work and how to engage with others to make them work that way. These expectations provide individuals with a sense that they share in the life of a community, reinforcing solidarity within a group with common struggles and pleasures, despite the absence of personal relationships among all members of the group.

Not merely conceptual, a social imaginary is reproduced through interaction. For example, Anderson (1983) suggests that widespread assumption of modern national imaginaries was tied in part to the daily ritual of reading the newspaper. Reading the same stories individuals became part of a nation that shared common values, interests and experiences. Symbols such as flags and monuments, events like the Olympics, and administrative acts such as census taking, map-making and museum establishment further articulated and reinforced national imaginaries.

Taylor (2001a) emphasises that the imaginary is not analogous to institutional rules and norms. An imaginary is an implicit and pre-conscious background, a common sense that ties a community together and legitimates certain communal practices. Rather than constraining individuals, an imaginary provides a framework for their routines, enabling them to exercise judgement and select alternatives within a particular field of action. It provides a repertoire of ways to engage.

The analysis here focuses on how an imaginary can enhance agency by shaping the conditions of possibility for collective action. It is suggested that an imaginary can unify and motivate a dispersed network of collaboratives without constraining creativity and initiative. To accomplish this, the paper traces how a network imaginary is circulated through media, technological standards and planning

methodologies, and the practices are examined through which the imaginary is expressed and reproduced among network participants.

3. Methods

This study of the FLN was initiated in 2005 to characterise and evaluate this novel approach to fire planning and management. The authors have examined landscape collaboratives and regional networks, as well as the overall network structure, function and outcomes (Goldstein and Butler forthcoming a, Goldstein and Butler, forthcoming b, Goldstein *et al.* forthcoming). The case study elements of this paper are informed by four years of fieldwork during which time the authors have conducted nearly 100 interviews, attended 12 regional workshops and national meetings, and collected and reviewed hundreds of documents, including landscape level planning products, network meeting agendas and summaries, co-operative agreements, newsletters, briefing documents and other outreach materials.

For this paper, the analysis has focused on how planning guidelines, technological protocols and media products circulate and what effect they have on the network. The protocols and guidelines supplied to network sites have been examined, as well as the corresponding products that landscapes generated such as restoration plan elements and GIS maps. Newsletters were reviewed, as well as performative media such as field excursions and presentations, to clarify internal depictions of network action. Using a grounded theory approach (Strauss and Corbin 1990), the study began by coding sentences and phrases as specific instances of emergent concepts were charted. Interviews were conducted and internal survey data were consulted to test and refine the codes. Next, categories and subcategories were drawn out of relationships among the data as an emergent theoretical framework was developed. As the interpretive model began to take shape, inspiration was drawn from the idea of a social imaginary and theoretical constructs about a network imaginary were reinterpreted as new data were fed into the analysis to complete the 'grounding' of the theory.

4. Crisis in fire management

In March 2001, TNC and the USFS, the agency most responsible for national fire research, training and co-ordination (Pyne 2004), jointly hosted the 'National Fire Roundtable' in Flagstaff, AZ. The two-day workshop brought together over 60 fire managers and scientists from public agencies and conservation organisations. According to a final report of the meeting (Shlisky 2001), participants agreed that over-zealous firefighting throughout the 20th century threatened the ecological integrity of wildlands and exposed adjacent settlements to more frequent and intense fires. They recommended the reintroduction of fire through 'prescribed burning', and proposed that burning be co-ordinated across public and private jurisdictions at a landscape scale. They agreed that an essential part of getting land managers to engage in fire restoration was helping managers to overcome organisational barriers to landscape-scale co-operation and resolve conflicting management prerogatives. Roundtable participants developed a framework for the nation-wide co-ordination of landscape-scale efforts to reduce fuel loads and restore ecological functions in fire-adapted ecosystems.

Both TNC and the public agencies were motivated to try new approaches to fire management and break from their longstanding autonomy over lands under their

control. By the early 2000s, the frequency of large wildfires in the United States had increased four-fold and acreage burned six-fold compared to the previous two decades (Westerling *et al.* 2006). Firefighting expenditures comprised an increasing share of land management appropriations, rising from an average of \$1.1 billion per year in the late 1990s to over \$3 billion in the 2000s (US Government Accountability Office 2007). The general public had begun to pay attention to this growing challenge after the 2000 wildfire season that destroyed hundreds of homes and scorched millions of acres of forests. As summed up at the Roundtable: "The public and Congress are aware, as never before, that we need to rethink our suppression-focused relationship to fire and fire-adapted ecosystems" (Shlisky 2001, p. 1). By the end of 2000, the agencies published what has become known as the National Fire Plan (USDA Forest Service 2000), and Congress directed \$1.8 billion to manage wildfire risk and work collaboratively to protect development reaching ever more deeply into forests and grasslands.

At the Roundtable, agency representatives shared TNC's premise that ecological fire restoration was needed to address the legacy of a century of fire suppression (Shlisky 2001). Far from a radical suggestion, this had been the basis of prescribed burning policies in federal agencies since the early 1970s (Carle 2002). For the agencies, the challenge was not making this policy shift, but implementing it. From 1995 to 2000, they treated an annual average of 1.4 million federal acres with prescribed fire. Yet in 2001 the agencies concluded that 211 million acres were in moderate or critical need of fuels reduction, and the backlog would only grow with current treatment levels (National Wildfire Coordinating Group 2001). Although policy and discourse had changed 30 years earlier, budgets, training and incentives remained focused on fire suppression, the only source of budgetary growth amidst an overall slide in agency funding (Arno and Allison-Bunnell 2002). Property protection and safety remained primary goals of fire management, priorities that continued to receive the support of Congress and the public. While some agency managers had become adept in fire restoration, they generally operated independently and focused on relatively small and isolated fire restoration projects. As the USFS Director of State and Private Forestry stated: "The agencies understood ecoregions and large-scale. That did not translate to land managers prioritizing projects that looked at ecology at a landscape scale" (Jim Hubbard, personal communication 27 Apr 2007).

While the USFS was struggling with reorienting fire management, TNC was engaged in redefining its mission from acquiring and managing lands to contributing to the protection of 10% of the world's ecosystem types, a task that would require working with public lands agencies and other large landholders, both in priority landscapes and at a policy level. TNC scientists concluded that developing partnerships to resolve the fire crisis was critical as fire exclusion had impaired the ecological health of nearly half of the ecosystem types in the United States (The Nature Conservancy 2001). After the Roundtable, TNC's fire staff proposed implementing a Conservation Learning Network, an approach developed in the late 1990s for freshwater systems, wetlands, grasslands and invasive species. An inter-organisational fire restoration network would allow TNC to collaborate with agency land managers on multiple landscapes through a co-ordinated strategy to extend ecological restoration beyond the boundaries of TNC landholdings and enhance the importance of fire restoration across US fire management.

5. US Fire Learning Network

By the end of 2001, TNC, USFS and the land management agencies of the DOI had signed a co-operative agreement creating the US Fire Learning Network (FLN) (The Nature Conservancy 2001). In the first year, the USFS budgeted nearly \$300,000 in support of the network and TNC provided staffing and in-kind resources to the project. TNC hired two network co-ordinators who sent a request for proposals to contacts identified at the Roundtable and selected 25 landscape teams across the United States to take part in a two-year planning process. The co-ordinators developed planning guidelines for landscape-level collaboration, and organised biannual gatherings for landscape team leaders to review and receive feedback on their planning efforts and obtain updated scientific and policy information (TNC Global Fire Initiative 2003).

Following this first phase, FLN staff proposed organizing regional networks based on geographic proximity and ecological similarity (TNC Global Fire Initiative 2003). Each region consisted of 4 to 13 landscape teams. The number and location of regions has shifted over time with new regions being established and others phasing out. By the end of 2008, the network had engaged over 650 participants in more than 80 landscape teams and 12 regional networks (Lynn Decker, National FLN Co-ordinator, personal communication, 12 Aug 2008; Figure 1).

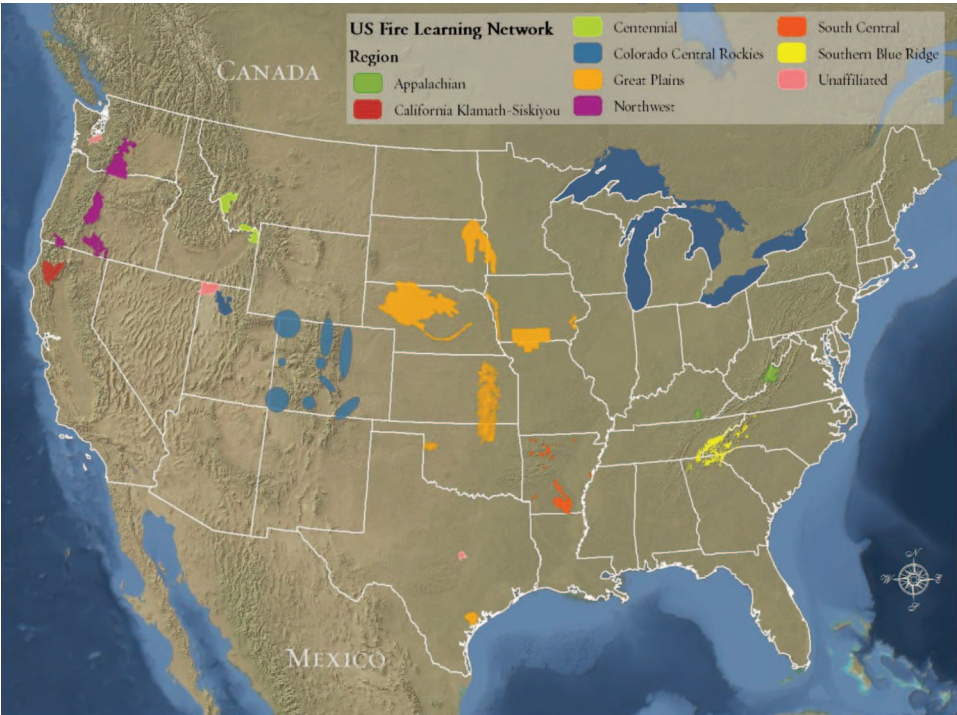


Figure 1. US Fire Learning Network landscapes and regions 2008.

Source: The Nature Conservancy US Fire Learning Network.

Note: Several regions that participated in the 2004–2006 period completed their work and did not continue in the next phase of the FLN while other regions were established to take their place. As a result, some regions mentioned in this paper are not represented on this map. See online colour version for full interpretation, at www.informaworld.com/cjep.

Landscape teams include stakeholders interested in ecological fire restoration, primarily managers from agencies and non-profit organisations that own or manage land within landscape boundaries. At biannual regional network workshops, leading landscape participants gather to refine their work in peer review and problem-solving sessions, group discussions, field excursions and other interactive forums designed to enhance their planning efforts. After returning to their landscapes, teams refine their plans using new ideas and approaches from the gatherings. Staff provided planning guidelines, technological protocols and media such as newsletters and websites to guide landscape planning efforts and communicate across the network at multiple scales.

5.1. Planning guidelines

FLN planning guidelines consist of a four-step series of exercises to guide development of ecological restoration plans. First, landscape teams develop ecological models of current conditions and a collaborative vision statement to clarify restoration goals. Second, they map current conditions and desired future conditions to identify the need for change, and begin to prioritise restoration locations. Third, they develop an implementation plan to reach desired future conditions. Finally, partners prepare protocols to monitor results and identify strategies for implementing adaptive management.

5.2. Technologies

While developing these ecological fire restoration plans, landscape teams rely on a variety of technologies, particularly mapping and modelling protocols that can be integrated into Geographic Information System software. In workshops and publications, FLN co-ordinators and regional leaders suggested that landscape teams use Fire Regime Condition Class (FRCC) as a primary protocol in developing ecological models and maps. In FRCC protocols, current ecological conditions are depicted on a three-part scale that denote the level of departure from a reference or historic ecological condition. A variety of FLN mapping and modelling products use FRCC as a way to prioritise restoration sites. FLN landscapes frequently use FRCC as a measure of achieving desired future conditions by monitoring how closely existing conditions reflect historic conditions.

5.3. Media

FLN leaders also maintain a variety of ways to communicate throughout the network. The most widely circulated media form is the *FLN Dispatch: Emerging Lessons from the Fire Learning Network*, a monthly newsletter distributed to network members and posted on the FLN website (see http://www.tncfire.org/training_usfln_networkpubs.htm). The FLN published 36 of the newsletters from June 2004 to October 2008. FLN co-ordinating staff who write each *Dispatch* gather ideas during FLN meetings or follow-up on ideas suggested by other network participants. Each *Dispatch* is a short success story about the activities of FLN participants. The *Dispatches* circulate within the network and beyond as registered by the thousands of *Dispatch* downloads from the FLN website each year (Fulks 2007).

Media also includes forums where key messages and stories are 'performed' on the network stage. Regional and national workshops provide opportunities for

network participants to present their successes and failures. During landscape team presentations, field excursions and other interactive forums, participants have multiple opportunities to share stories and images from their landscape efforts.

6. Planning guidelines and technologies shape assumptions and expectations

This section traces how network participants used FLN planning guidelines and FRCC protocols to describe their landscapes in ways that reinforced shared assumptions and expectations. Their descriptions, while responsive to local circumstances, reflected commitments to a common problem definition and ecological worldview, a shared view of appropriate actions and challenges, and agreement about who were credible and legitimate partners.

6.1. Problem definition

TNC and public land management agencies initiated FLN as a response to a common problem frame that fire suppression had altered historical fire regimes. As stated in the summary report of the National Fire Roundtable: "Decades of active fire exclusion . . . has resulted in unsupportable fuel loads and vegetation changes that pose a serious threat to both biodiversity health and public safety" (Shlisky 2001, p. 1). FRCC protocols and planning guidelines reinforced this understanding, grounded in the pre-European past as an original reference condition, impaired through short-sighted agency fire suppression.

The planning guidelines directed landscape teams to describe the ecological role of fire before European settlement, assembling their account of the "natural or historical fire frequencies, intensities, and extents" from tree-ring dating, historic records and eyewitness accounts. Each landscape account began with a description of pre-European conditions, described as natural, healthy and unimpeded by human intervention except for aboriginal burning, generally not considered a departure from the historical fire regime. For example, in the Blacklands landscape of the South Central FLN, team members commented in their first planning exercise that "Fire is the most important ecological process maintaining the distribution, composition, and diversity of blackland prairie, woodland, and forest communities". Drawing on detailed scientific studies, the team described the frequency, intensity and seasonality of fires due to lightning strikes as well as aboriginal burning patterns. Their assessment concluded that fire burned annually through the Blacklands, maintaining the health of grassland, prairie and savanna systems by preventing fast-growing red cedar trees from encroaching on the landscape.

Planning guidelines also directed partners to identify conservation targets and threats specific to their own ecosystems, linking agency-led fire suppression and increasingly catastrophic wildfire to measures of ecosystem health such as biodiversity decline. In their first planning exercise, the Jemez Mountains landscape team in the Southwest FLN identified six ecosystems as important conservation targets, including mixed conifer forests, ponderosa pine forests and woodlands, piñon-juniper woodlands, grasslands and savannas. All of the systems are threatened by altered fire regimes associated with fire suppression and four of the pine or juniper target systems suffer from "intense fire from surrounding fire prone systems" which can lead to catastrophic changes to target ecosystems. Emphasizing problems

resulting from suppression, Jemez partners wrote that “Prior to the 20th century, extensive crown fires in ponderosa pine were extremely rare, if they happened at all”.

Supporting this approach, FLN co-ordinators recommended using FRCC to model landscape conditions, reconstructing vegetation type and coverage as well as fire frequency and intensity in unaltered, pre-European times. By comparing historic conditions to today, FRCC yielded an estimate of how altered landscape fire regimes were. In the Northwest FLN, team members modelled past and existing conditions of the 2 million-acre Deschutes landscape in central Oregon, focusing on two ecosystems – Ponderosa Pine and Mixed Conifer. The FRCC based model highlights the extent to which fire regimes were altered and what vegetative cover types were most affected. The Deschutes team concluded that these two ecosystems suffered from moderately to severely altered fire regimes largely due to fire suppression.

6.2. *Ecological worldview*

FLN planning guidelines and FRCC protocols guided network participants through a landscape assessment that oriented partners toward ecological restoration rather than other goals such as property protection or fuels reduction. Using the planning guidelines, partners identified how altered fire regimes threatened species, natural communities and ecosystems. The Deschutes landscape team described how fire suppression stressed Ponderosa pine and Lodgepole pine, the Bayou landscape in the South Central FLN focused on loss of oak woodlands due to lack of fire, and the Onslow Bight landscape in the Southeast region noted declines in red-cockaded woodpecker due to fire exclusion from Long-leaf Pine. Based on these ecological targets, partners identified the type and location of natural communities with the greatest need of restoration. Next, they developed at least two scenarios, one projecting the ecological consequences of continuing current management practices and the other suggesting how target species, natural communities and ecosystems could improve with restoration of natural fire regimes. The Land between the Lakes (LBL) landscape team in the South Central FLN described how current management practices would continue ecological degradation, leading to dominance of closed oak-hickory forests on a landscape that was historically open woodland and grassland. They developed an alternative scenario in which prescribed burning and thinning would restore the historical balance of oak woodlands and grasslands and open oak-hickory forest.

FRCC reinforced this ecological focus. As landscape team members modelled divergence of current vegetation cover from historic conditions, they sought to integrate soil, topographic and vegetation data with historical records such as Government Land Office archives and tree-ring dating. Using this data, the Deschutes team depicted historical conditions and mapped the existing distribution of vegetation cover. On their map entitled ‘Biophysical Setting’ (Figure 2), they coded human land uses, such as urbanised and agricultural areas, with a grey colour along with rock, glacier and lava – areas that had no particular significance for the analysis – reinforcing the primary importance of ecological characteristics over other factors.

6.3. *Appropriate action*

FLN planning guidelines and technologies align with a common understanding of two key priorities that constituted appropriate action, each at distinct temporal,

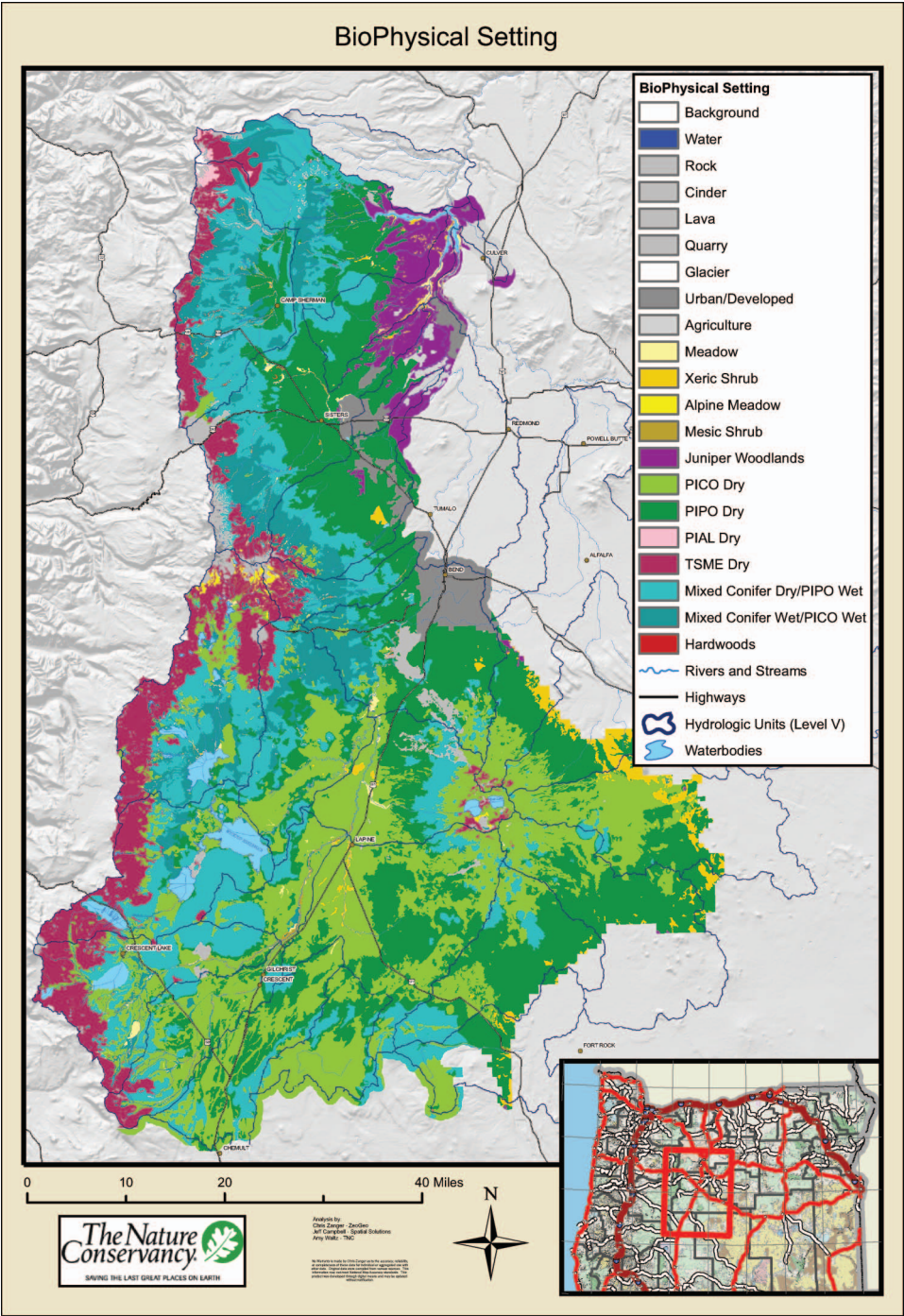


Figure 2. Biophysical setting map developed by Deschutes landscape November 2007. Source: The Nature Conservancy US Fire Learning Network. See online colour version for full interpretation, at www.informaworld.com/cjep.

spatial and organisational scales. One priority was strategic planning, conducted inter-organisationally, at landscape scales and with long time horizons. The other was a tactical emphasis on determining precisely where and how burning should be performed. This hands-on fire restoration was conducted principally within individual ownerships and jurisdictions, at the smaller scale of forest stand, and over the time span of a few days. These two priorities, one strategic and the other tactical, were closely integrated and mutually supportive.

Supporting strategic action, planning guidelines required each site to develop integrated descriptions such as landscape-scale maps and ecological models that subsumed smaller-scale features such as forest stands. FLN co-ordinators selected landscapes that crossed administrative or organisational boundaries and often covered millions of acres, aligning themselves with the agreement at the National Fire Roundtable that, "The appropriate scales of restoration are landscapes and ecoregions" (Shlisky 2001, p. E-1). For example, the Onslow Bight in the Southeast FLN covers more than 1.3 million acres and incorporates conservation lands managed by the Department of Defense, USFS, TNC, North Carolina State Parks, North Carolina Department of Wildlife Resources and US Fish and Wildlife Service. While public lands dominate most landscapes, some had significant private landholdings, such as the Niobrara in Nebraska, with over 10 million acres of privately held lands including large and small scale ranching operators as well as TNC. Temporally, planning guidelines encourage partners to plan over the interval required for full ecological restoration. All FLN landscapes projected at least 10 years into the future, and some extended the timeline much further, such as the 500-year horizon projected by the Long Island Pine Barrens FLN.

FRCC mapping supported this strategic emphasis, aggregating vegetation types in different successional states to yield landscape-scale measures. FRCC analysis produced estimates of 'natural range of variability', the appropriate fire frequency and intensity within a particular ecosystem, ranging from a few years for low intensity fires to centuries for severe, stand-replacing fires (Jim Smith, National Landfire Co-ordinator, personal communication 7 Mar 2007). In turn, FLN landscape teams could use these estimates to calculate where and how much burning was required. The Deschutes landscape used FRCC to compare the historic distribution of key ecosystems to the current distribution to determine 'percent departed' (Figure 3), which was used to identify shortfalls in the current level of effort and establish long-term restoration priorities (Amy Waltz, NWFLN regional co-ordinator, personal communication, 21 Nov 2007).

Complementing this strategic emphasis, planning guidelines directed landscape teams to develop three-year fire restoration strategies within individual ownerships and administrative boundaries, or partner on a small scale across shared boundaries. The Alleghany Highlands landscape of the Central Appalachians FLN developed a 'burn plan' on 1200 acres of Warm Springs Mountain, where TNC and the USFS share a boundary. This cross-boundary project could be implemented quickly and was a familiar scope of operation for field staff from both organisations. Participants are also drawn to a more intimate scale of operation when applying FRCC to establish landscape treatment priorities. The Deschutes team used FRCC to map and model smaller scale restoration projects on their landscape, such as on the Sunriver Healthy Forest Restoration Project and South Bend Healthy Forest Restoration Project, both within the Deschutes National Forest.

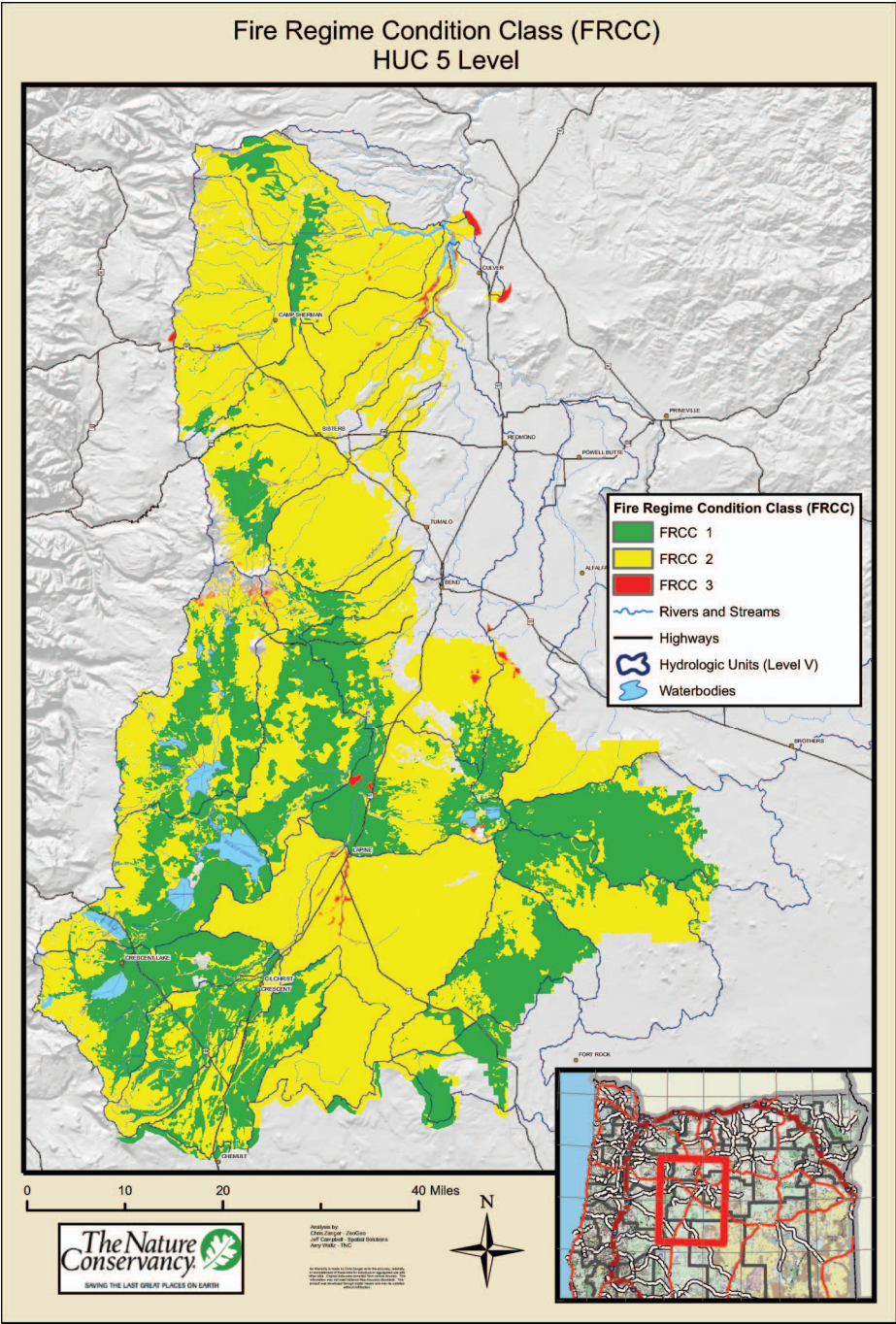


Figure 3. FRCC map of Deschutes landscape November 2007.
Source: The Nature Conservancy US Fire Learning Network.
See online colour version for full interpretation, at www.informaworld.com/cjep.

6.4. Challenges

In accord with the emphasis on organisational reform in the co-operative agreement, FLN planning guidelines directed partners to identify obstacles to connecting across ownerships and management boundaries in order to increase controlled burning and fuels reduction. Responding to this guidance, individual landscapes emphasised barriers related to organisational structure, priorities, regulation and policy. Participants rarely mentioned barriers such as a lack of understanding of fire regimes or technical obstacles to implementation. Of the nearly 50 active landscapes in 2003, the top barriers consisted of an inability to co-ordinate with partners, lack of funding, cultural resistance to fire reflected by the lack of a coherent message in support of ecological fire restoration, lack of staff capacity to engage in restoration work and regulatory procedures (Figure 4).

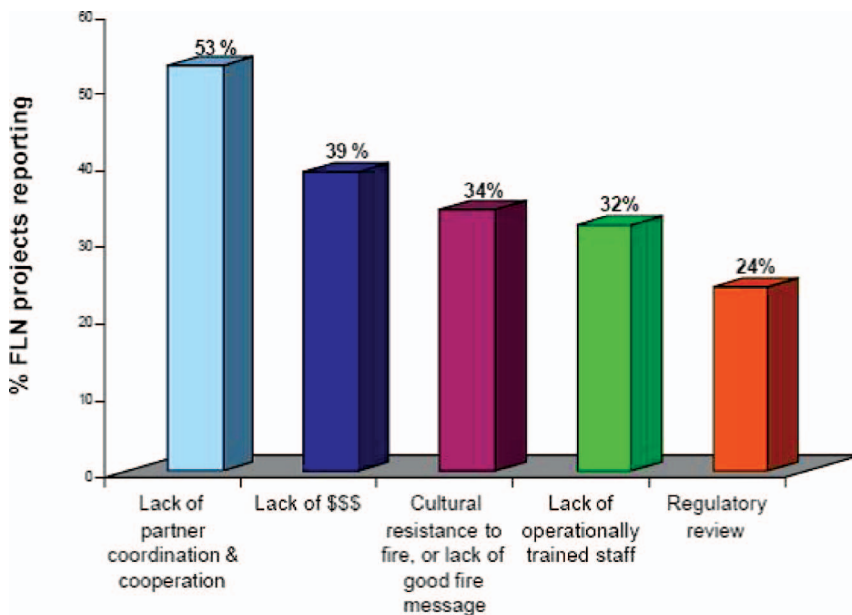


Figure 4. Barriers to implementation adapted from FLN newsletter (Fire Learning Network March 2003).

Source: The Nature Conservancy US Fire Learning Network.

6.5. Collaborating with credible and legitimate partners

FLN planning guidelines and FRCC had implicit expectations of who would legitimately engage in inter-organisational and cross-boundary co-operation. While the FLN co-operative agreement included the public as potential co-operators, in practice only those with training and experience in natural resource management had requisite skills to participate in FLN. This approach to collaboration enhanced the ability of fire professionals to share resources and knowledge and engage in co-operative activities to restore fire-adapted ecosystems across organisational and administrative boundaries.

Partners worked together across organisational or jurisdictional boundaries to develop plans at the landscape scale. Each FLN landscape was directed to recruit

partners from key organisations, and planning guidelines emphasised collaboration as an underlying expectation, including instructions such as ‘Collaboratively draft a three-year implementation plan’ and ‘Collaboratively begin drafting a monitoring plan’. FRCC analysis supported this effort by requiring partners to gather ecological data across jurisdictional boundaries and collaborate to develop ecological models and prioritise restoration tasks. The Deschutes team’s efforts to develop a landscape-wide FRCC model included participants from nearly all the organisations with management and advocacy interest in the area, including two National Forests, a BLM district, the Central Oregon Intergovernmental Council, state agencies such as the Department of Forestry and Department of Fish and Wildlife, TNC, Sierra Club and the National Audubon Society.

While encouraging collaboration, planning guidelines and technologies also circumscribed who could collaborate. This was not done by explicitly defining legitimate partners or intentionally excluding anyone, but by assigning tasks that could be conducted only by those who understood fire dynamics, ecological science and a wide range of environmental planning and management techniques. For example, the first activity of the planning guidelines is to identify conservation targets and threats. These terms are not defined and no further direction is given other than to prioritise the list related to altered fire regimes. Then, partners are asked: “what is the natural or historical fire frequencies, intensities and extents for matrix fire-adapted systems?” These are the earliest and in many ways the simplest components of the guidelines, but for the uninitiated, what is required to define targets and threats or describe fire regimes for ‘matrix fire-adapted systems’ is not likely self-evident. FRCC protocols require even greater expertise, including requiring an ability to collect, analyze and map data related to vegetation cover, soil types, tree-ring dating and geologic features, to model ecological system characteristics and to operate in a technological environment that requires spatial modelling, database management and mapping capabilities.

This complexity stymied attempts to open the network to a broader array of participants. In the South Central FLN, the LBL landscape team leader noted that the range of collaborators was limited because many partners supported FLN work, but were not interested in developing complex ecological fire restoration plans (personal communication, 14 Mar 2007). Motivated by a similar concern, the leader of the Bayou landscape informally consulted with partners since few were willing to participate in data gathering, analysis and synthesis required to complete planning guidelines (personal communication, 14 Jun 2006). In the Deschutes example above, although there are many agencies and organisations represented, the participants generally were resource management professionals. Thus, while the FLN set the stage for greater co-operation and co-ordination among professionals working in different disciplines and under different organisational mandates, the tools and techniques used in the FLN did not invite the participation of the uninitiated.

7. Media reinforce assumptions and expectations

7.1. *FLN publications*

Media reinforced FLN assumptions and expectations, particularly those connected with professional practice. Of the 36 *FLN Dispatch* newsletters, 32 addressed the theme of collaboration, emphasizing how partnerships with other fire management professionals can forward restoration objectives. A total of 33 *Dispatches* addressed

the two forms of appropriate action, with 11 highlighting long-term ecological planning at the regional scale, 16 describing on-the-ground burning and other land treatments on smaller areas, and 6 covering both. Twenty-one of the *Dispatches* also described practitioners overcoming organisational barriers to fire restoration, particularly through collaboration. Although *Dispatches* rarely explicitly argued in favour of ecological restoration of fire-adapted ecosystems or described disruption of pre-European fire regimes by agency action, every *Dispatch* was consistent with these assumptions.

While they contain the same assumptions and expectations, media function differently than planning guidelines and technologies. Rather than guiding partners through tasks that reinforce common assumptions and expectations, FLN media provides a showcase for exemplary practitioners and collaboratives, role models using FLN technologies and planning guidelines in particular landscapes. The October 2005 *Dispatch* reported on collaborative fire management planning in the half million-acre Huachuaca landscape in Arizona, which included stakeholders from federal and state public agencies, non-profit conservation organisations such as TNC and the National Audubon Society, and large private landowners. FLN planning guidelines were used to draw on best available science as well as professional experience to develop cross-jurisdictional ecological maps, design implementation strategies that included large-scale prescribed burning, and respond to organisational challenges such as an international border, limited operational capacity and endangered species regulations. The *Dispatch* described the group's planned burns on the Coronado National Forest as an expression of emergent capacity to implement restoration projects. The *Dispatch* described how Huachuaca partners were able to work together to overcome organisational barriers that hindered their ability to apply restoration treatments as well as how such collaboration enabled larger-scale planning and management.

As this suggests, FLN media accounts do not emphasise conformity with a single vision of how to use FLN planning guidelines and technologies. Rather they illustrate how FLN strategies and goals are interpreted by practitioners who are sensitive to regional history, opportunities and relationships. Some *Dispatches* reinforced this emphasis on individual agency and autonomy with descriptions of how partners rely on both technical and scientific knowledge and locally-situated professional judgement. The September 2004 *Dispatch* was one of nine that emphasised using best available scientific knowledge. It described how FLN partners conducting a 13-million acre rangelands assessment in New Mexico relied on agency ecological modelling protocols, satellite imagery and FRCC rankings. They mapped ecological conditions and departure from historical fire regimes, had their maps reviewed by other area professionals, and then shared them throughout the region. The frequency of *Dispatch* accounts of complex scientific analysis and modelling is matched by descriptions of tacit and field based expertise. The June 2005 *Dispatch* reports how the Great Plains FLN facilitated sharing field experience in grasslands restoration. In one example, members of a prescribed fire team described their experiences conducting large-scale burns. Exchanging ideas based on their situated or local knowledge, participants discussed how to improve adaptive capacity and build new partnerships with private landowners. The story concluded that: "... project teams learn from each other, with groups both contributing to and benefiting from an open exchange of ideas and information".

Both field knowledge and scientific expertise were promoted and legitimised as core practices in FLN. This reflected the expectation that the network would be

science driven, as stated in a project scoping document (The Nature Conservancy 2002) that all network products should meet "... a minimum acceptable standard for ecologically and scientifically based collaborative fire management planning". This requirement was matched by the expectation to draw on knowledge from other sources. As the FLN planning guideline for defining desired future conditions stated, participants should "use any and all available information ... including historical information, expert opinion, key species requirements, feasibility, natural disturbance regimes, spatial characteristics, intuition and gut feeling".

7.2. *Performative media*

Similarly, dramatic re-enactments provide performative exemplars. Field visits are one form of 'performative media' in which host sites lead FLN groups on project site tours. In July 2008, Central Appalachians FLN partners toured a 1200-acre site where the Allegheny landscape team had performed prescribed burning. The team described how TNC and USFS burned their lands in a co-ordinated effort. Standing on a rock outcrop overlooking the site, the team leader discussed how collaborative relationships with key management professionals enabled them to overcome organisational barriers to prescribed burning on a complex landscape with multiple ownerships. Team representatives fielded questions from the network participants as they walked around the site, still blackened from the burn. Network participants reviewed the restoration goals with the team and conducted on-the-spot assessments of fire effects on vegetation. The group brainstormed ideas about what next actions would enhance the restoration process. This tour reinforced assumptions and expectations about the operational scale of action, collaborating with fire professionals, focusing on ecological impacts of restoration activities, and overcoming organisational barriers through collaboration.

Another example of performative media is the 'landscape walk' held at the annual national FLN meeting in March 2007. Beforehand, the FLN co-ordinator asked landscape teams to prepare posters describing historical and current ecological conditions and organisational barriers, outlining their collaborative vision statement and long-term landscape-scale ecological objectives, and describing their collaborative planning work and project-oriented training and fieldwork. At the meeting, representatives from each landscape displayed their poster and supporting materials. Half of the landscapes stationed their tables, while the other half roamed among the posters, reading and asking questions while filling out an evaluation form. The co-ordinator gave roamers fake checks and instructed them to distribute 50,000 'landscape dollars' to projects they judged as having great potential. Roamers and those at the tables then switched, allowing everyone to play both roles.

Acting both as landscape representatives and external evaluators, participants aligned activity at each landscape with their collective assumptions and expectations. On their fake checks, where they responded to the question, "What about this project's history says 'success!' to you?" partners reinforced key FLN themes, including collaboration and regional-scale integration among agencies and land-holders, protection of sensitive or important ecological features, on-the-ground fire restoration projects, and development of planning tools such as burn prioritisation models. At the final dinner of the meeting, partners from the landscape that received the most landscape dollars were recognised and received an award.

Landscape walks and field visits were a type of participatory media, either describing or performing exemplary FLN practice. Acting at different times as both audience and performer, FLN partners worked in ways that were coherent with shared assumptions and expectations while also improvisational and responsive to local culture, conditions and circumstances. Rather than prescriptive, this was mutually reinforcing, as exemplary action elicited positive responses from other participants. Published media reinforced these landscape performances through efforts such as the posters that accompanied the landscape walk, or the FLN coordinators' compilation of information about individual landscape's planning, modelling, restoration action and collaborative partnerships, which they published in an FLN field guide of 37 exemplary landscapes (The Nature Conservancy 2007).

8. Network imaginary

FLN planning guidelines, technologies such as FRCC and the various types of FLN media reinforce common assumptions and expectations among network participants. Their assumptions and expectations constitute more than a common story about landscape-scale fire restoration, or a shared set of ecological goals shared by the FLN founders and sponsors. They include an understanding of the historical basis of the problem and the appropriate strategic and tactical response. In addition, they are collectively oriented toward overcoming organisational barriers and share tacit agreement that fire managers possess the credibility and legitimacy to participate in FLN collaborative efforts. Taken as a whole, these assumptions and expectations support an imaginary among network participants, a common understanding which enables partners to carry out the collective practices of the FLN.

Taylor (2004) emphasised that although imaginaries might originate as concepts or theories – as the FLN was originally described in the National Fire Roundtable and co-operative agreement – theories are not imaginaries, any more than a landscape map is the same as a fire manager's knowledge of the landscape. Circulating within a network rather than society as a whole, the FLN network imaginary takes shape through social practices such as planning guidelines and FRCC. These practices may not be new, but are taken up and transformed by association with the imaginary (Taylor 2002).

FLN assumptions and expectations that sustain the network imaginary guide individual action, but not the same way an individualistic ethic does. The FLN imaginary provides a bridge between the fire manager and the emergent collective. A shared goal and purpose provides FLN participants with an understanding of what it means to be a member of the group and a sense of their role in shared community life, a horizon and context for action that delimits appropriate behavior for self and others in the pursuit of ecological fire restoration. This reinforces their solidarity within a group with common struggles and pleasures, despite limited personal ties or mutual accountability among FLN partners. Taylor (2004) defines these imagined ties as "... common understanding that makes possible common practices and a widely shared sense of legitimacy" (Taylor 2004, p 23).

Rather than provide a set of explicit rules, the FLN imaginary indicates what the rules should be and the relationship between these rules by informing partner's self-understandings, practices and common expectations. As Taylor writes, an imaginary "begins to define the contours of [a participant's] world, and can eventually come to

count as the taken-for-granted shape of things, too obvious to mention” (Taylor 2001a, p. 22). The FLN imaginary includes things that are rarely explicitly stated, yet commonly held. For example, the FLN newsletters did not argue in favour of ecological restoration of fire-adapted ecosystems or describe how fire agencies disrupted pre-European fire regimes. Each *Dispatch* was consistent with these assumptions, which underpin the normal expectations that FLN participants have of each other, and enable them to carry out their collective practices.

8.1. *Situated in practice*

While the FLN was founded on the premise that there is a nation-wide problem with the degradation of ecological health in fire adapted ecosystems (The Nature Conservancy 2001), the planning guidelines and technologies enabled each landscape collaborative to situate the FLN imaginary in participants’ own experience and context, through their own actions, collective reasoning and choices. Rather than being an out-growth of theory, the imaginary was “nourished in embodied habitus” through practices that were engendered by FLN guidelines and technologies (Taylor, 2001b, p. 22). Practices are possible and make sense within the imaginary’s assumptions and expectations of one another, while carrying and legitimating the imaginary. This dialectic supports a ‘repertory’ of collective actions. As Taylor (2002) notes: “These understandings are both factual and normative; that is, we have a sense of how things usually go, but this is interwoven with an idea of how they ought to go, of what missteps would invalidate the practice” (Taylor 2002, p. 106–107). If FLN tasks were defined too narrowly, this would squelch the energy and initiative characteristic of collaboration. Instead, while the goals and strategies of each site-based collaborative was coherent and consistent with the FLN imaginary, their analysis and plan of action was grounded in the specific attributes of their region, a process that required creative interaction in each landscape.

8.2. *Media exemplars*

FLN publications and performative media also reinforced the assumptions and expectations constituting the imaginary. Like the newspapers Anderson (1983) described, *Dispatches* contributed to FLN partner’s awareness that there were many others who shared in similar struggles and pleasures. *Dispatches* enhanced network participants’ capacity to “achieve solidarities on an essentially imagined basis” (Anderson 1983, p. 77) by reading stories characterizing similar projects and practices. Taylor (2004) argues that a social imaginary is effectively distributed through images, stories and legends because these forms are accessible to a broader audience than theoretical or formal arguments. This firm distinction does not uniformly apply to the FLN, which engaged many technical experts to whom scientific and theoretical arguments could be dramatic and compelling evidence. Instead, it is suggested that the *Dispatches* be understood as technical accounts that were also exemplars, helping FLN participants define who they were, how they should act, and how to judge others.

An exemplar, as opposed to a typical member of a class or ‘prototype’, is a concept that Kuhn (1970) defined as ‘concrete problem-solutions’ to the puzzles that are encountered within an overarching paradigm. In this sense, the *Dispatches* cited above were exemplars of how partners should deploy technical and scientific

knowledge and locally-situated professional judgement. Strongly particularised and normative, each of these *Dispatch* stories shows how individual practice expresses a feature of the imaginary. Unlike a technical description, exemplars enhance coherence while not inhibiting innovation and creativity, since they provide a particular solution to a general problem. Performative media such as field trips and the landscape walk were also exemplary in this sense, and added a communicative component, reinforcing the network imaginary for both media presenter and recipient.

8.3. Self-sustaining collaboratives

The FLN imaginary helped to create and maintain the collaborative network, entraining individuals as they circulated through the network in association with planning guidelines, technologies and media. These circulations, once begun, can be self-perpetuating like a community of practice (Lave and Wenger 1991) in which participants start as legitimate peripheral participants and assume leadership roles as they acculturate. Where the FLN is distinct from a community of practice is in relying not only on personal mediation but also on action at a distance. Human agency is delegated (Latour 1995) to planning guidelines, technologies and media in order to reproduce assumptions and expectations and a common imaginary within an expanding network. Alignment between sites still requires human contact, but much less than a collaborative usually requires. In the FLN, performative demonstrations like field trips and the landscape walk took place at national and regional gatherings, where partners were also acquainted with the proper use of planning guidelines and technologies through PowerPoint presentations and mutual 'peer review'. This inter-personal interaction permits transference of the tacit, embodied knowledge required to implement a standardised technique (Shapin and Schaffer 1985).

9. Conclusion

In designing the FLN, organisers principally relied on their ability to operate at a distance (Latour 1995), delegating the means to guide disparate landscape teams through a common collaborative planning process. Partners in each FLN landscape described their landscapes and developed fire restoration plans by applying FLN planning guidelines and modelling technologies and protocols such as FRCC. These guidelines and technologies, while responsive to local circumstances, mutually reinforced a common imaginary among FLN actors by initiating practices that foster specific assumptions and expectations about worldview, problem definition, challenges, appropriate actions and assignment of credibility and legitimacy. Through print and performative media such as newsletters and field excursions, FLN conveyed and reinforced the imaginary across a network of locally situated actors. Reading about or listening to other successful practitioners or enacting an exemplary role themselves, FLN partners were invited to imagine their own positioning within the network, and to creatively act in synch with the FLN imaginary to re-orient their practice in distinct landscapes.

A shared imaginary not only allows networks such as the FLN to coherently regenerate and expand across disparate place-based collaboratives, it can also scale up, enhancing the potential for more fundamental change. A network of

collaboratives with a common imaginary can diffuse innovation throughout organisations and institutions, operating both at place-based sites and through the influence of partners on their own organisations. This combined action can be coherent without central co-ordination, with partners acting independently in similar ways and autonomously speaking with a unified voice. The network infrastructure of planning guidelines, technologies and media fosters this solidarity without the need for pervasive authority or personal ties. This offers an alternative to what Fung and Wright (2003) call the unworkable models of democratic central control or strict decentralisation. They note that central control is often incapable of learning from local experience or taking into account local circumstances and intelligence, to which can be added that central approaches may disempower local initiatives by constraining their creativity and initiative. They also dismiss unco-ordinated decentralisation as isolating, incapable of diffusing innovation or being accountable to a shared objective.

The FLN imaginary did not create an appreciation for ecological fire restoration among partners. They had recognised the need for change for decades (Pyne 2004). Instead, it crystallised a wider grasp of their whole predicament, recognition of why their expectations were not being met and their experiences were dissonant with their assumptions. This imaginary permitted them to challenge hidden presumptions that had come to "... define the contours of [their] world, and ... come to count as the taken-for-granted shape of things, too obvious to mention" (Taylor 2001a, p. 22). In a collaborative setting, partners had the opportunity to translate this dissonance into an alternative approach that could give a different purpose to familiar relationships and practices to provide greater meaning and significance for their actions as fire managers. Cultivating new forms of social self-understanding, they collectively imagined a new social order, laying the foundations for broader institutional transformations.

References

- Amy, D., 1987. *The politics of environmental mediation*. New York: Columbia University Press.
- Anderson, B., 1983. *Imagined communities: reflections on the origin and spread of nationalism*. New York: Verso.
- Arno, S.F. and Allison-Bunnell, S., 2002. *Flames in our forest: disaster or renewal?* Washington, DC: Island Press.
- Booher, D.E. and Innes, J.E., 2002. Network power in collaborative planning. *Journal of planning education and research*, 21, 221–236.
- Carle, D., 2002. *Burning questions: America's fight with nature's fire*. Westport, CT: Praeger.
- Fire Learning Network, March 2003. *Improved collaboration advances implementation of fire restoration strategies*. Boulder, CO: US Fire Learning Network.
- Flyvbjerg, B., 1998. *Rationality and power: democracy in practice*. Chicago: University of Chicago Press.
- Fulks, W., 2007. *Restoring fire adapted ecosystems final progress report*. Boulder, CO: US Fire Learning Network.
- Fung, A. and Wright, E.O., 2003. *Deepening democracy: institutional innovation in empowered participatory governance*. New York: Verso.
- Goldstein, B.E. and Butler, W.H., forthcoming a. The US Fire Learning Network: providing a narrative framework for restoring ecosystems, professions, and institutions. *Society and natural resources*.
- Goldstein, B.E. and Butler, W.H., forthcoming b. Expanding the scope and impact of collaborative planning: combining multi-stakeholder collaboration and communities of practice in a learning network. *Journal of the American Planning Association*. Accepted subject to revision.

- Goldstein, B.E., Butler, W.H., and Hull, R.B., forthcoming. The Fire Learning Network: a promising conservation strategy for forestry. *Journal of forestry*.
- Gray, B., 1989. *Collaborating: finding common ground for multiparty problems*. San Francisco: Jossey-Bass.
- Healey, P., 1997. *Collaborative planning: shaping places in fragmented societies*. London: MacMillan.
- Innes, J.E. and Booher, D.E., 2000. Planning institutions in the network society: theory for collaborative planning. In: W. Salet and A. Faludi, eds. *The revival of strategic spatial planning*. Amsterdam: Elsevier/Oxford University Press, 175–189.
- Innes, J.E., Connick, S., and Booher, D.E., 2007. Informality as a planning strategy: collaborative water management in the CALFED Bay Delta Program. *Journal of the American Planning Association*, 73, 195–210.
- Kuhn, T., 1970. *The structure of scientific revolutions*. 2nd ed. Chicago IL: Chicago University Press.
- Latour, B., 1995. *ARAMIS or the love of technology*. Cambridge, MA: Harvard University Press.
- Lave, J. and Wenger, E., 1991. *Situated learning: legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- Margerum, R. and Whittall, D., 2004. The challenges and implications of collaborative management on a river basin scale. *Journal of environmental planning and management*, 47, 407–427.
- Menkel-Meadow, C., 2005. *Participant reactions: workshop on deliberative democracy and dispute resolution*. Cambridge, MA. [online] Available from: <http://stellar.mit.edu/s/project/deliberativedemocracy/materials.html> [Accessed 14 Oct 2009].
- National Wildfire Coordinating Group, 2001. *Review and update of the 1995 federal wildland fire management policy*. Boise, ID: National Wildfire Coordinating Group.
- Pyne, S.J., 2004. *Tending fire: coping with America's wildland fires*. Washington, DC: Island Press/Shearwater Books.
- Shapin, S. and Schaffer, S., 1985. *Leviathan and the air pump: Hobbes, Boyle and the experimental life*. Trenton, NJ: Princeton University Press.
- Shlisky, A., 2001. *National Fire Roundtable summary report*. Boulder, CO: TNC Global Fire Initiative.
- Strauss, A. and Corbin, J., 1990. *Basics of qualitative research: grounded theory procedures and techniques*. Newbury Park: Sage.
- Taylor, C., 2001a. *On social imaginary* [online]. Available from: <http://blog.lib.umn.edu/swiss/archive/Taylor.pdf> [Accessed 14 Oct 2009].
- Taylor, C., 2001b. Two theories of modernity. In: D.P. Gaonkar, ed. *Alternative modernities*. Durham, NC: Duke University Press, 172–196.
- Taylor, C., 2002. Modern social imaginaries. *Public culture*, 14, 91–124.
- Taylor, C., 2004. *Modern social imaginaries*. Durham, NC: Duke University Press.
- The Nature Conservancy, 2001. *Proposal to promote restoration of fire-adapted ecosystems through education and community-based partnerships*. Arlington, VA: The Nature Conservancy, Conservation Science Division.
- The Nature Conservancy, 2002. *Requests for proposals: Fire Learning Network landscape site selection and funding program*. Boulder, CO: The Nature Conservancy.
- The Nature Conservancy, 2007. *US Fire Learning Network field guide 2007*. Boulder, CO: TNC Global Fire Initiative.
- TNC Global Fire Initiative, 2003. *Proposal to restore fire adapted ecosystems: 2004–2006*. Tallahassee, FL: The Nature Conservancy.
- US Government Accountability Office, 2007. *Wildland management: a cohesive strategy and clear cost-containment goals are needed for federal agencies to manage wildland fire activities effectively*. Washington, DC: US Government Accountability Office.
- USDA Forest Service, 2000. *Protecting people and sustaining resources in fire-adapted ecosystems: a cohesive strategy; a collaborative ten-year strategy for restoring health to fire-adapted ecosystems*. Washington, DC: USDA Forest Service.
- Weber, E.P., 1998. *Pluralism by the rules: conflict and cooperation in environmental regulation*. Washington, DC: Georgetown University Press.
- Westerling, A.L., et al., 2006. Warming and earlier spring increase Western U.S. Forest wildfire activity. *Science*, 313, 940–943.