# Chapter 5.4. Community Engagement in the Decisionmaking Process for Public Land Management in Northeastern California

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Revisions to forest plans, as directed by the U.S. Department of Agriculture, Forest Service, 2012 Planning Rule, has appreciable focus directed toward management of National Forest System lands so that they are ecologically sustainable and contribute to social and economic sustainability (see Chapter 1.1, Dumroese, this synthesis, *The Northeastern California Plateaus Bioregion Science Synthesis: Background, Rationale, and Scope*; and Chapter 5.1, Flores, this synthesis, *An Introduction to Social, Economic, and Ecological Factors in Natural Resource Management of Northeastern California Public Lands*). This social component requires involving the community throughout the forest plan revision process to determine opportunities for continued community engagement in the management of their local national forests, as is the case for the Lassen and Modoc National Forests. Scientific peer-reviewed literature on community engagement specific to the area around the Lassen and Modoc National Forests is limited. Thus, this chapter takes a more general approach to the literature by first exploring community engagement and surveying how local decisions are made across different aspects of ecosystem services, including water, timber, biomass, recreation, and other uses. Second, we explore the social, cultural, and economic nonmarket values local residents and visitors attribute to forests. Third, we explore how land management agencies address the inter-relatedness of landscapes, people, and management actions, including how habitat improvement and forest restoration projects have been conducted through local partnerships. Finally, we explore examples of community collaborations and best practices, especially those surrounding fire management. Where possible, we include scientific literature that directly relates to the Lassen and Modoc National Forests. This chapter is driven by the following question asked by stakeholders in the area surrounding the Lassen and Modoc National Forests (hereafter the Lassen, the Modoc, or the Lassen-Modoc):

- How can the Forest Service work to seek better local engagement, coordination, and involvement of local communities?

## *Community Engagement in Ecosystem Service Decisions*

### The Shift to Community Collaboration in Forest Management

"Forest management in the United States derives from the interaction of the two dominant institutional structures of private and public ownership," (Vose et al. 2012, p. 104) but it is influenced by policy and community involvement. Local governments are guaranteed advisory roles in coordinating management plans via the National Forest Management Act of 1976 and the National Environmental Policy Act of 1970. This includes identifying "areas where additional research is needed" during the planning process (Hart 1995, p. 153). Local governments have a unique opportunity to influence Federal land use decisions through public-participation provisions in national forest planning, as the public review period of this science synthesis illustrates. Lassen-Modoc community members and local Forest Service staff asked:

- How do forest managers include local communities in decisionmaking processes for an all-lands management approach to benefits such as water, timber, biomass, recreation, and multiple use?

Decisions surrounding ecosystem services are shaped by land management agencies and organizations (e.g., Federal, State, and local level agencies and nongovernment organizations) and communities using national forests (e.g., local communities, landowners, tourists). Due to the dynamic process of land management and land use, approaches surrounding ecosystem service decision making can examine and include the perspectives of surrounding forest participants.

In the United States, decision making regarding natural resources and ecosystem services is a multilevel governing process including Federal authorities (e.g., Congress, Forest Service), State authorities (e.g., California), and local agencies (e.g., the Lassen-Modoc region).

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In natural resource management policy and practice, a shift in decisionmaking authority from centralization to decentralization has evolved (Ambus and Hoberg 2011; Berkes 2010; Bixler 2014; Larson and Soto 2008). Where centralized processes grant the upper management of a governing authority full power, also described as top-down decision making, decentralized processes redistribute decisionmaking power from upper management to lower and local management within the same governing body, also described as bottom-up decision making.

The reorganization of decision making in the 1990s was a shift toward community-based natural resource management (Bixler 2014). Building on this effort, multilevel and polycentric governance models—systems with "multiple centers of authority" (Bixler 2014, p. 158)—were developed. Additionally, processes surrounding devolution—power distributed throughout local communities including local residents, agencies, groups, organization, and landowners—emerged (Berkes 2010).

**Figure 5.4.1**—Successfully engaging the local community in the decisionmaking process regarding local ecosystem services is challenging because of the complexity of land resource issues and the diversity of social values brought by a variety of stakeholders (photo by Ken Sandusky, Forest Service).

### Local Involvement Across Ecosystem Services

According to Poteete and Welch (2004), the procedure and practice of decision making regarding local ecosystem services requires a balance between the complexity of the land resources and the characteristics of the participants that benefit from and use those resources (fig. 5.4.1). The complexity of land resources includes the resources themselves (e.g., water, timber, wildlife, and so forth) and the various benefits received from those resources (e.g., water supply, wood products, food, recreation, amenities, income, etc.). Participants of forest land include: landowners; Federal, State, and local government agencies; tribal communities; forest community residents; organizations; management consultants; recreation users; natural resources; wildlife; and more.

While data specific to the Lassen and Modoc Counties is limited, information from surrounding areas and similar regions can provide comparative context. Located in Northern California in the Sierra Nevada mountain range, Lassen and Modoc Counties and surrounding mountain areas have historically provided the predominant concentration of California's forest products industry (Charnley and Long 2014). During the last several decades, California's forest products industry has significantly declined in both supply and demand due to a variety of factors (e.g., regulation, policy, economics, wildland fire, and technology) (Morgan et al. 2004, 2012). Decreases in forest industry production have led to a substantial decline in forest industry employment, consequently, affecting the residents and employees within the Lassen-Modoc region. As reviewed in Chapter 5.2 (Flores and Russell, this synthesis, *Demographic Trends in Northeastern California*), the Lassen-Modoc region is now classified as a nonmetropolitan area with a low-income population and a low-minority population, including multiple tribal communities (Charnley et al. 2018).

The exploration of successful collaborations between Federal agencies and tribes may offer insight into various approaches to local decision making. For example, Taylor and Cheng (2012) define community-based forestry as a "strategy that promotes democratic practices, strengthens local livelihoods, and sustains forest ecosystems for the benefit of all community members" (p. 110) that can be enhanced when agencies approach community engagement without previously defined criteria or *a priori* measurements of success (e.g., how the land was to be managed). Community-based forestry can be successful when forest community residents are afforded the opportunity to make decisions concerning ecosystem services, because local residents are "[embedded] in their communities and make their own best possible judgments about how to remain true to their underlying objectives" (p. 120). Considering these community-based forestry principles, collaborative decision making between residents of the Lassen-Modoc region and the Forest Service could involve an investigation into the local demands and desires for various ecosystem services such as timber, water, biomass, recreation, and other uses.

*Timber and Restoration: Timing and Communication*

Charnley and Long (2014) acknowledge there are "fewer jobs associated with timber production alone, and there is a greater proportion of jobs in forest restoration" (p. 635). One aspect of forest restoration involves the rehabilitation of land after a wildfire. For example, following a wildfire, the amount of quality timber available for harvest is greatly reduced, while damaged and fire scorched timber is abundant. To help restore and rehabilitate the fire-affected land, various postfire activities, such as salvage logging, are implemented (fig. 5.4.2). These restoration and rehabilitation activities provide both benefits and hindrances to the fire-affected area (see Charnley and Long 2014; McCool et al. 2006; Ryan and Hamin 2008, 2009). For example, salvage logging benefits the local fire-affected community by boosting the local economy through an increase in jobs, timber materials, and funds for restoration. In contrast, salvage logging can damage the ecology of the forest but could be approached in a manner that is appropriate to, and less harmful of, the ecology.

Because of the declines in forest products and subsequent increases in postfire restoration, decisions surrounding wildland fire restoration and rehabilitation could be made prior to wildfire occurrence, with both the Forest Service and local community members (Charnley and Long 2014). Additionally, these decisions could benefit the local community (e.g., funding from salvage logging could be invested in restoration and prevention programs for the community). Lastly, wildland fire restoration decisions often utilize ongoing communication from the Forest Service to the community, as well as from the community to the Forest Service, about land restoration processes and outcomes.

*Water: Local Agencies, Shared Jurisdictions, Realistic Modeling, and Education*

This subsection focuses on the decisionmaking processes surrounding groundwater, watershed, and water supply. California's groundwater resources are managed by the California Department of Water Resources (CA-DWR 2019) and governed by the Sustainable Groundwater


**Figure 5.4.2**—Salvage logging, such as this operation following the 2017 Parker Fire on the Modoc National Forest, can provide economic value to local communities. Scenarios balancing economic value with other ecosystem services, such as habitat for wildlife, could be discussed among stakeholders before disturbance events in order to provide more timely and effective postdisturbance activities (photo by John Cichoski, Forest Service).

Management Act (SGMA). According to the SGMA, local agencies are required to form groundwater sustainability agencies (GSAs) to act as decisionmakers and plan-developers regarding their local groundwater basins (fig. 5.4.3). The DWR Groundwater Basin Boundary Assessment Tool indicates Modoc County has two medium-priority basins: the Klamath River Valley, whose sub-basin is Tule Lake, and Big Valley (CA-DWR n.d.). Lassen County shares the responsibility to manage Big Valley Basin with Modoc County, but has no other large- or medium-priority basins in its jurisdiction. Modoc and Lassen Counties oversee decisions regarding their respective and shared basins.

Watershed decisions in Lassen County center around the Feather River watershed, which serves as the main tributary of the Sacramento River and is "an important source of water for California" (Charnley and Long 2014, p. 637). The Feather River flows through Lassen Volcanic National Park and the Lassen National Forest. A subset of watershed decisions included the examination of the supply-side amount of water allotted and available to a community, plus the demand-side amount of water used by that community—all in relation to how to protect the water supply, the quality of the water, and the various ways to educate people about their water supply.

Water management decisions conducted at the local level that include collaboration across multiple stakeholders have seen success, as in the institutional framework provided by California's GSA requirement. The following studies also show how input from invested local communities can help local and Federal land management agencies determine information, education, and processes that enrich decision making.

A recent study of the Truckee River watershed in California and Nevada evaluated how restoration and land-protection scenarios impacted water quality and quantity, and illustrates the value of community input for resource forecasting (Podolak et al. 2017). Podolak and colleagues used the Natural Capital Project's Resource Investment Optimization System model (Vogl et al. 2013) to design "four future land use scenarios, with activities targeted to the best locations for water quality and supply improvement" (Podolak et al. 2017, p. 125). They "collaborated with stakeholders who were interested in, benefit from, or that have specific regulatory requirements that could be met by improving water quality and supply

**Figure 5.4.3**—Local communities, engaged in the decisionmaking process concerning water management, can have a profound impact on the quality and quantity of water resources, such as Ash Creek on the Modoc National Forest (photo by Ken Sandusky, Forest Service).

in the watershed" (p. 125). They found that the input provided from stakeholders was critical to developing real-life scenario models. "By engaging stakeholders so thoroughly, we were not only able to complete a much more realistic set of models, but to also create information that has a much higher likelihood of getting used" (p. 134).

Another study that informs ecosystem service decisions asked how the distance between "forests to faucets" influenced peoples' willingness to pay to protect their water supply (Adhikari et al. 2017, p. 2). Adhikari and colleagues found when the distance between forests and faucets was minimal, as in Santa Fe, NM, local residents were willing to pay a monthly service charge to protect their "city's water supply from catastrophic wildfire" (p. 2). Meanwhile, people living farther from their water supply in Albuquerque, NM, were also willing to pay, but public educational programs were needed to increase their understanding of the effectiveness of watershed restoration (p. 24).

*Biomass: Incentive Dilemmas and Landowner Variability*

As discussed in Chapter 5.3 (Flores and Haire, this synthesis, *Ecosystem Services and Public Land Management*), the use of biomass for energy production can be costly. Therefore, to encourage biomass removal and reduce fire hazards, the Forest Service has examined several strategies including collaborating with private forested landowners to encourage pro-social conservation efforts. For example, Alpizar et al. (2017) studied how the Forest Service tried cash incentive rebates for landowners

to privately conserve their land and contribute to the public good. The Forest Service ran into issues surrounding how best to incentivize landowners, and who to include or exclude from the rebate. The authors found "targeting of a new environmental rebate to those who have shown little pro-social or pro-environmental inclinations could negatively affect the motivation of those who did choose to contribute" (p. 200). While incentive programs to encourage private landowners to conserve their own land may work, the Forest Service can examine whether it is better to reward landowners already conserving the land or to incentivize nonconserving landowners to start conserving.

Additionally, the size of the property owned by landowners can influence forested land conservation. Landowners with properties greater than 494 acres (200 ha) received advice from the Forest Service and other organizations about how to manage their land, while those with properties less than 494 acres (200 ha) did not receive land management advice. Land ownership was quickly shifting from larger properties owned by a few people, toward smaller parcels owned by many people. Therefore, "as ownerships become increasingly fragmented, outreach focus and methods will need to shift to more effectively target the owners of smaller properties" (Ferranto et al. 2012, p. 1082).

Decisions surrounding biomass removal and production involves understanding not only how biomass can provide various benefits to a community (e.g., monetary, energy, production, jobs, funding), but also how biomass removal can reduce wildfire hazards. Because the demographics of private forested landowners is changing, land managers can draw upon the study by Alpizar et al. (2017) on incentivizing pro-social conservation efforts, as well as the demand of Ferranto et al. (2012) that education concerning the management of private forest land include owners of smaller properties when designing strategies to be utilized by the local forested communities.

### *Recreation and Agriculture: Appropriateness of Policy Direction and Sector Growth*

According to Charnley et al. (2018) in the *Synthesis of Science to Inform Land Management within the Northwest Forest Plan Area* (Spies et al. 2018), Modoc and Lassen Counties are classified as nonrecreation dependent and nonretirement destinations. While the Lassen-Modoc region may not be considered a recreation destination, "cross-country skiing was frequently listed" as a recreational activity by Modoc County visitors (Winter et al. 2014, p. 515). Additionally, as mentioned earlier in Chapter 5.3 (Flores and Haire, this synthesis, *Ecosystem Services and Public Land Management*), research into Modoc's geothermal potential is underway, leading to potentially new recreational or other uses of the land (Moeller 2017).

Stem et al. (2003) examined how communities can participate in eco-tourism to "provide local economic benefits while also maintaining ecological integrity through low-impact, nonconsumptive use of local resources" (p. 388). One way is through establishing protected areas to encourage conservation of the land. Additionally, tourism-related park fees can be charged to visitors, allowing them to explore the protected area while also providing financial support. Stem et al. (2003) stressed the importance of "integrating environmental awareness raising and knowledge generation into eco-tourism activities" (p. 410) to increase conservation. The "education could not be limited to employees or the local communities. It could extend to the ecotourists themselves, with an emphasis on the ecological, cultural, and social history of the region they are visiting" (p. 410). Although nature-based tourism has been a growth industry with associated economic benefits and is considered one of the fastest growing industries, it is likely to be limited in "more remote areas with less charismatic species or scenery" (Balmford and Bond 2005, p. 1225). While the Lassen and Modoc areas may not offer exotic or threatened environments equal to the desires of ecotourists, the incorporation of environmental awareness across the local community to include the region's historical values may provide some insight.

The Lassen-Modoc region is, however, an area suited for ranching and agriculture. According to the local Hazard Mitigation Plan Update, the Modoc County Agricultural Commissioner's Office, and the U.S. Department of Agriculture, "agricultural production in Modoc County is the most significant contributor to the local economy" (Modoc County 2016).

Agricultural decisions about the use of forested land are greatly affected by "population-driven urbanization, the comparative returns to agriculture and forestry, and policies that influence the expression of the first two factors" (Vose et al. 2012, p. 106). Modoc County also cautions that agricultural and wildfire hazards could also be taken into consideration, because both are highly

likely to occur and the damage caused by either would be catastrophic to an extensive area of the land (Modoc County 2016). State- and Federal-level land use policies that govern the direction of the bioenergy sector may be quite impactful to agriculture production in the county context. For example, Vose et al. (2012) note:

> "[t]he degree to which a bioenergy sector favors agricultural feedstocks, such as corn, or cellulosic feedstocks from forests will determine the comparative position of forest and crop returns to land use, and therefore land use allocations. The allocation among feedstock sources depends on energy policies at both federal and state levels, which could differentially affect rural land uses." (p. 106).

### *Community Collaborations and Fire Management*

The Lassen-Modoc area stakeholders posed a number of questions regarding community collaborations, especially around fire management:

- What are some examples of formal collaborations through structured agreements with local communities (e.g., Memoranda of Understanding)?
- What are some best practices for land management agencies to engage local communities in collaborative decision making and management actions?
- How does engaging the local public about fire (e.g., through Fire Safe Councils, partnerships, an all-hands approach, and using fire as a management tool) influence community engagement and decision making?

Land management agencies are using various adaptive strategies to encourage and engage local community collaboration surrounding fire management and the use of fire as a management tool (fig. 5.4.4). For example, case studies of "successful adaptation efforts in the United States" (Vose et al. 2012, p. ix), which focus on collaborative partnerships across science and management within national forests and national parks, are available for other land management organizations. These case studies include examples of internal cooperation across national and local agencies plus external collaboration across agencies and stakeholders, with a goal of demonstrating how adaptation strategies have previously been implemented. Development of one such adaptive approach using a science-management partnership as described by Vose et al. (2012) is exemplified by the case study of Littell et al. (2011) that demonstrates how management of the Olympic National Forest is accomplished in collaboration with the Olympic National Park, the University of Washington Climate Impacts Group, tribal groups, and private landowners. Additionally, the Strategic Framework for Science in Support of Management in the Southern Sierra Nevada, CA (Nydick and Sydoriak 2011) shows how Federal resource managers, local agencies, university scientists, and stakeholders collaborated to develop knowledge and decisionmaking tools regarding climate change and adaptation. (See Chapter 4 of Vose et al. 2012 for more examples.)


**Figure 5.4.4**—In the Western United States, fire management is an area where input from local stakeholders can guide the use of fire as a silvicultural tool to promote resilient forests. Successful engagement of stakeholders by land managers may require using a suite of adaptive strategies tailored to address the social and cultural aspects of a diverse stakeholder group (photo by Ken Sandusky, Forest Service).

In the Southwest, land management agencies have explored collaborative initiatives specific to using fire-reduction practices to protect wildland urban interface areas and using fire to reduce large-scale beetle epidemics (Vose et al. 2012). Regarding fire reduction, forest thinning and assertive use of fuel treatments can be implemented to change forest conditions to limit the intensity of a wildfire and reduce the possibility of crown fires (Vose et al. 2012). Fuel treatments (e.g., reducing forest fuels such as surface, ladder/small trees, and canopies) are completed prior to a wildland fire and are aimed at slowing down fire progression and creating a "defensible space" (Keller 2011, p. 12) around residential areas. An example of successful implementation of fuel treatments is demonstrated by the 2011 Wallow Fire, which started in the White Mountains in Arizona and spread to Western New Mexico. Previously

implemented fuel treatments stopped the Wallow Fire from continuing as a "crown fire" and dropped the fire to the ground level, allowing firefighters to eventually stop the fire. See Keller (2011) for more information on fuel treatments and the 2011 Wallow Fire.

For these adaptive strategies to be implemented and produce benefits, "[s]ignificant financial resources and collaboration across different agencies and landowners will be necessary" (Vose et al. 2012, p. 221). For additional examples of formal collaboration in general and regarding fire management specifically, see Charnley et al. (2014).

### Community Collaboration Strategies Regarding Wildland Fire

To understand community collaboration strategies regarding wildland fire, it is helpful to describe why fire management strategies are important to California communities. In California, communities located in or adjacent to forest and rangelands are highly focused on fire management strategies. This fire management emphasis is prevalent due to the devastating effects fire has on California's ecosystem, landscape, wildlife, landowners, agencies, local communities, and recreationists. A study concerning forest management in California observed that "fire hazard is clearly a topic for which all types of landowners support cooperative management, and many landowners are already implementing management to reduce fire risk on their land" (Ferranto et al. 2013, p. 1098). For example, landowners were most willing to cooperate with land neighbors and least willing to cooperate with Federal agencies. While landowners were willing to cooperate with local government agencies, their desire to cooperate decreased at the State level and again at the Federal level. Ferranto et al. (2013) claimed that themes discussed by Bergman and Bliss (2004) may be relevant to California, suggesting that cooperative land management efforts surrounding wildfire "may be more successful if implemented at a local level with local partners" (Ferranto et al. 2013, p. 1097).

Various management and decisionmaking strategies focused on cooperative engagement to reduce fire risk are being implemented by local communities and agencies (fig. 5.4.5). Charnley et al. (2014) identified different processes and approaches to the collaborative management of wildland fire, such as the formation of community councils and networks, which address the risks of wildfire and coordinate prescribed fire burning. These community-based organizations were comprised of multiple entities—Federal, State, and local agencies; tribes, academic institutions, landowners, and local residents—and included Fire Safe Councils, prescribed fire councils, and Fire Learning Networks. These councils and networks, along with other community-based groups, facilitated education outreach programs, participatory action research, cooperative forest landscape restoration projects, and community wildfire protection plans. The intention was to help engage the communities in fire-prone areas with practices of wildland fire hazard reduction and to introduce fire as a management tool.

Collaborative programs between land management agencies and local communities surrounding fire management and the use of fire as a management tool have been beneficial. For example, collaborative efforts to reduce wildland fire have returned several co-benefits including the protection of property, increased forest resilience to periodic wildfire, and reduction of wildfire intensity, crown fires, tree mortality, and suppression difficulty (Vose et al. 2012). Additionally, while more research is needed to understand the benefits from collaborative programs between Federal forest managers and tribal communities, these processes "may yield important social and ecological benefits, including landscape heterogeneity" (p. 182). Furthermore, collaboration with tribal communities and "reintroducing traditional Native American burning practices" may provide forest managers "opportunities to learn about these fire effects and incorporate them into forest management practices and applied restoration efforts" (p. 182).

Such collaborations between Federal forest managers and tribal communities have attempted to "incorporate tribal traditional ecological knowledge in research and forest management and to respect tribal needs and traditions regarding access and caretaking" (Lake and Long 2014, p. 180). These collaborative strategies include consulting with and forming partnerships across "forest managers and tribal governments, communities, individuals (where appropriate), and organizations (e.g., the California Indian Basketweavers Association)" (p. 180). Forest managers asked questions and listened to stories surrounding tribal needs specific to "habitats, specific plants, or other valued resources" (p. 180), as well as the "season, frequency, or intensity" (p. 181) related to traditional burning strategies of tribal cultural values.

**Figure 5.4.5**—Public engagement that fosters cooperation can lead to different processes and approaches in how that cooperation proceeds administratively as well as by identifying on-the-ground approaches to reduce fire risk (photo by Ken Sandusky, Forest Service).

Examples of forest management and tribal community collaboration include partnerships between the Modoc and the Cultural Advocates for Native Youth "to restore native tobacco plants at burn piles" (Lake and Long 2014, p. 181), plus partnerships between the Lassen and Maidu Tribes to restore beargrass to the region (Charnley et al. 2008). Lastly, the Klamath and Six Rivers National Forests and Karuk Tribe integrated ways "to allow for specific cultural management activities, including reintroduction of fire onto the landscape" through the ceremonial burning of "the mountain above Katimiin, a historical village site" (Lake and Long 2014, p. 181).

## *Integrated Systems of Landscape, Community, and Management*

Decisions and actions regarding landscapes, communities, and land management are interrelated, with processes of one or more entities potentially impacting the others. Judgments surrounding land projects are sometimes decided upon and conducted solely by land management agencies, while other projects are undertaken in partnership with local communities. We discuss integrated socioecological systems in this section by examining successful agency-community partnerships involving habitat improvement and forest restoration. We keep in mind the following questions asked by the Lassen–Modoc stakeholders:

- How do land management agencies address the inter-relatedness of landscapes, people, and management actions?
- What are the benefits of restoration and habitat improvement projects that have been conducted through local partnerships?

### Shared Stewardship

In 2018, the Forest Service published a report on an initiative for shared stewardship and decision making with States, partners, and tribes to "identify landscape scale priorities for targeted treatments in areas with the highest payoffs" (USDA Forest Service 2018). Through

shared stewardship, the Forest Service envisions multiple stakeholders coming together across landscapes to co-manage risk, target investments using the latest science tools, focus on outcomes at the appropriate scale, and develop new approaches to deal with the wildland fire environment. The Forest Service initiative argues that across broad landscapes, shared stewardship between the Forest Service, States, and other stakeholders using science-based approaches are needed to assess risk, evaluate tradeoffs, manage insect epidemics, restore watersheds, and conserve species at risk. While different States and stakeholders have different mandates, the impacts of fire, insect outbreaks, and other disturbances do not have land ownership boundaries. Thus, by using a shared stewardship approach, the Forest Service designed a strategy to co-manage large landscapes by bringing their partners and stakeholders together to maximize access to existing science tools, set goals, priorities, tradeoffs, and make decisions on where to invest resources.

Shared stewardship is also referred to in the social science literature as co-management. For forest management, shared stewardship represents a shift from centralized governance toward local community involvement. Co-management is primarily concerned with user participation in decision making and with linking communities and government managers. In a collaborative management context, local knowledge and experience have equal status with experts and expert knowledge (Cardinal and Day 1999). Adaptive management is a concept that is similar to co-management, but places a greater emphasis on learning-by-doing in a scientific way to deal with uncertainty. An adaptive management approach encourages learning throughout structured experimentation and management flexibility (Hilborn and Walters 1992). Although co-management and adaptive management may be more effective in meeting biological and socioeconomic goals than other types of management, such as centralized governance, current research suggests that co-management can lead to local perceptions of inequality (Ward et al. 2018). Thus, the shift from co-management and adaptive management to shared stewardship implies multiple ownership and knowledge that leads to joint responsibility for land management (Laronde 2016). In other words, shared stewardship redistributes power dynamics from centralized top-down resource management across all stakeholders. The benefit is that when individuals and groups take different levels of responsibility for different landscape types, shared stewardship draws on dynamic social networks that hold reserve social and economic capital, as well as expertise across groups that could be better utilized (Svendsen and Campbell 2008).

Shared stewardship is an effort to bridge co-management and adaptive management, recognizing that ecological systems are dynamic and nonlinear. Shared stewardship in the 21st century takes place within an interdisciplinary effort, and challenges established assumptions of scientific certainty, stability paradigms in both ecological and social sciences, and the reliance upon expert solutions. The vision of shared stewardship is continuous learning in order to adapt to rapid changes and complexities that consider humans and ecosystems as an inseparably linked social-ecological system (Armitage et al. 2007).

### Polycentric Governance

Bixler (2014) describes how landscapes, communities, and land management are integrated by stating: “all actors are somehow already involved, albeit in different ways” (p. 164) in the management of the forest. To understand the concept of actor involvement, “a shift in thinking about forest users, stakeholders, and other actors” (p. 164) can take place. This shift requires forest management agencies and researchers to move from a mindset that forest agencies can “‘involve’ them [local communities] or give them a voice in forest management decisions” to a mindset of “polycentric governance” (p. 164) or a realization that actors are already embedded and interrelated in an ecological system. This notion of embeddedness involves recognizing how the role of one actor can impact the roles of other actors.

Community collaboration around fire risk management is an example of working through the inter-relatedness within socioecological systems and how multiple actors can influence fire incidents. Or as Adhikari et al. (2017) point out, “high-severity wildfires present significant risk exposure to interconnected natural and human systems” (p. 3). For example, landowners who practice pro-environmental behaviors and remove biomass and fire hazard timber help reduce the start and spread of a fire; while landowners who do not practice fuel removal may aid fire events (Charnley and Long 2014). Outreach efforts concerning wildland fire management from local agencies and organizations help reduce wildland fire, but only when all land actors, not just landowners of larger properties, are informed (Ferranto et al. 2012). Tribal

communities assist in fire management efforts due to their knowledge and utilization of the forested land achieved from centuries of experience (Lake and Long 2014), yet past interactions between government agencies and tribal communities have resulted in a distrust of government from tribes (Norgaard 2007). Furthermore, landscape features (e.g., climate, presence of biomass, topography, etc.) greatly contribute to wildland fire activity (Collins and Skinner 2014), including watershed and groundwater impacts on the level of moisture in the landscape. Wildfire and water quality are therefore mutually interactive (Adhikari et al. 2017, Podolak et al. 2017). The dynamic processes of wildland fire also include the knowledge and actions of recreation users, fire councils, firefighters, search and rescue teams, and others who contribute to the start, spread, and extinction of a wildland fire.

Government land management agencies have conducted a variety of restoration and habitat improvement projects in partnership with local communities. From multiple entity councils (e.g., fire safe and prescribed fire councils) to educational outreach (e.g., fire learning, forest ecosystems); community participation action research and plans (e.g., community wildfire protection plan) to restoration projects (e.g., Collaborative Forest Landscape Restoration Projects, Wyden Authority Projects, Stewardship Contracting), these forest management collaborative efforts have seen both positive and negative results (Charnley et al. 2014). Partnerships formed across agencies and local communities that include a focus on habitat improvement and forest restoration can provide interrelated co-benefits to the Lassen-Modoc region. These co-benefits include accountability and ownership of forest management across multiple actors and "opportunities to redress underrepresentation in resource management" (p. 663). Community collaboration projects and conflict management are discussed further in the next section.

## Conflict as a Tool for Creative Resolution

Interrelated socioecological systems often produce conflict across multiple participatory actors. When conflict arises, land managers can address these problems. Below are two scenarios regarding socioecological conflict, tension regarding forest road access and disagreements over subsistence resources, and how land managers addressed these tenuous situations using creative resolution.

### *Resolving Conflict Concerning Forest Road Access*

In forest management, conflict surrounding "roads to access natural resources" (Hunt et al. 2009, p. 128) is prevalent (fig. 5.4.6). While a plethora of actors participate in these natural resource road systems, some key influencers include users with: industrial interests such as commercialization, construction, and development; forest management and operation interests; residential interests; tourism and recreation interests; socially and culturally significant interests such as gathering and hunting; and environmental interests. Additionally, animals, forest ecology, vehicles, and so forth participate in this system. Therefore, resource managers can balance their decisions concerning roads and road use carefully, as their judgments can have "varying effects on people and ecological systems" (Hunt et al. 2009, p. 128).

Conflict concerning forest road access is high among "tourism operators and recreationists" (Hunt et al. 2009, p. 129). These conflicts are mainly centered on five themes: goal interference, social values, process inequity, distributive inequity, and context. Conflict surrounding goal interference evolve when the "behaviors of some individuals interfere with the desired outcomes of others" (p. 133). Conflict over social values develop "when individuals have different views over acceptable uses of lands" (p. 133). Conflict concerning process inequity emerge when the decisionmaking process surrounding forest management planning and road management is

**Figure 5.4.6**—The use of forest roads can be a contentious topic. Engaging and involving the community in decision making can help land managers better understand the social, managerial, and environmental contexts necessary to resolve conflict (photo by Ken Sandusky, Forest Service).

perceived as imbalanced. Conflict regarding distributive inequity arise when "the distribution of economic benefits from past decisions" (p. 135) are perceived as unfair. Lastly, a lack of understanding of the various "social, physical, and managerial contexts" (p. 136) of participating actors also contributes to the conflict.

To understand further the "reasons for conflict over forest road access" (p. 137), Hunt et al. (2009) designed a conceptual model to illustrate this interrelated conflict system, as seen in figure 5.4.7. In this figure, the "relationships among the key themes" (p. 138) is apparent. As Hunt et al. (2009) state:

> Goal interference will affect perceptions of distributive inequity from management decisions and conflict in instances when people disrespect management decisions (e.g., using motorized vehicles in prohibited areas). Social values differences result in varying views on rights of using publicly owned resources and needs to protect remoteness as a value. These social values may affect perceived fairness of decisionmaking processes (process inequity) and the outcomes from these processes (distributive inequity). When people disrespect management decisions, social values may directly lead to conflict. Perceived process inequity will result from differing contexts and social values (e.g., expectations for a public decisionmaking process). These perceptions will affect the ways that individuals evaluate the fairness of outcomes from the process (i.e., distributive inequity). Finally, perceptions of unfair decisions may lead to conflict between remote tourism and road-based recreation interests (p. 138).

Using this conflict conceptual model as a guide, resource managers may be able to identify the "potential causes of conflict for their case" (p. 140) and adjust their management and decision making toward mitigating the sources of conflict. Managers can apply this conflict concept in practice in several ways. For example, managers can reexamine past decision making that was perceived as unfair and introduce ways to ensure decisions are made using a consensus-based approach (e.g., making sure to include local stakeholders, residents, and tribes in the process, and facilitate opportunities for these citizens to provide feedback). Once a consensus-based approach is initiated, this process could be continued for future decision making. Additionally, education tools can be implemented to train citizen decisionmakers. Lastly, managers can identify the reason for the conflict in order to ultimately minimize the conflict.

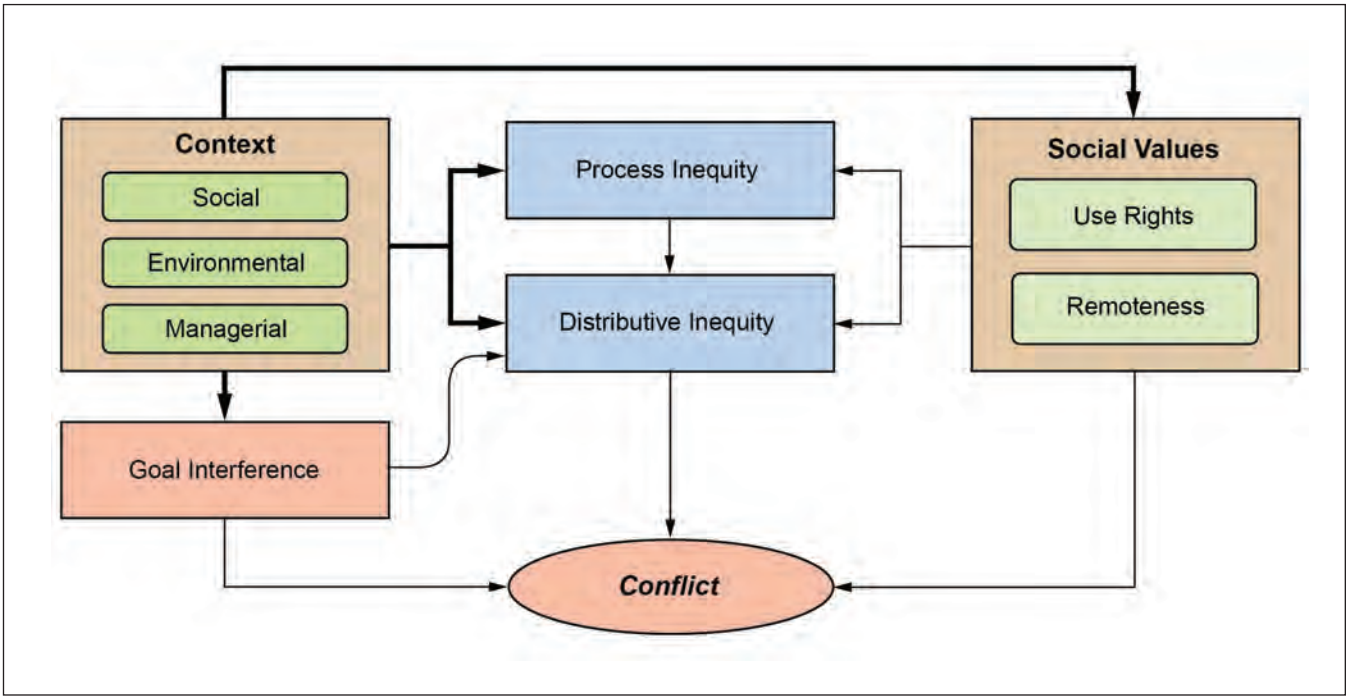


**Figure 5.4.7**.–Conceptualizing sources of conflict for forest road access management. Bold lines indicate relationships that strongly influence conflict (from Hunt et al. 2009, p. 138).

*Resolving Conflict Surrounding Subsistence Resources and Nontimber Forest Products*

Within forest management, conflict surrounding subsistence resources, also referred to as "a way of life" (Dick 1996, p. 19) including hunting and gathering, and nontimber forest products (NTFPs) is prevalent. Conflict concerning subsistence resources stems from a "difference in perspective" (p. 19) across groups who use the land for subsistence, and the different types of uses that user groups want to make of limited resources. Some have attributed conflict surrounding NTFPs on the "power differentials between public forest managers and forest-dependent communities" (Watson 2017, p. 333); specifically, how the Federal government manages forest resources. Summaries of two case studies further understanding on how to creatively resolve conflict within forest management: mitigating conflict surrounding subsistence resources (Dick 1996) and NTFPs (Watson 2017).

Dick (1996) claimed that "[w]ithin a subsistence community, the use of wild, renewable natural resources is characterized by sharing within a community identity" (p. 26). Subsistence sharing leads to the establishment of interrelated and interdependent relationships across the community, thereby developing strong partnerships. When forest managers are interacting with rural areas such as tribal communities that practice subsistence values, managers can be aware that placing an economic value on subsistence practices is not possible. Instead, managers can learn about the social and cultural significance and "integrated whole" (p. 26) of the subsistence process. When forest managers learn more about subsistence practices, they will be able to establish stronger relationships and mitigate conflict with tribal and rural forested communities.

For example, forest management practices often examine the subsistence harvest of a natural resource and believe the practice begins and ends at the harvest. Instead, the harvest "consists of pre-harvest activities, harvest, processing, distribution and exchange, preparation, and barter" (Dick 1996, p. 26). "It is the complex system of customs, norms, mores, and values guiding these activities that deserves the focus, because it is fundamentally different from, and often opposed to, the relationships emphasized by the flow of commodities through the marketplace" (p. 26).

To help forest managers understand subsistence resources, Dick (1996, p. 27) proposes six basic tenets that forest managers can be aware of when managing subsistence resources:

1. Subsistence practices may supplement cash income for some people, while "for others it is cash income that supplements the subsistence culture or lifestyle."
2. Subsistence activities can help people during "times of decline or collapse of market economies," therefore, these "subsistence resources could be protected."
3. Subsistence activities can help people during "tough times (e.g., illness in the family or old age)," therefore "subsistence resources could be protected so they can serve to mitigate the adverse impacts of disabilities."
4. Decisionmaking surrounding the management and allocation of resources could take into account the values of subsistence resources (these values may be tangible and/or intangible).
5. To properly analyze subsistence processes, a development of "new methodologies and expanded databases for comparisons between subsistence values and market values for the affected resources" are needed.
6. Lastly, "to address the meaning of subsistence resources in the context of community sharing," forest managers can conduct qualitative analysis.

Watson's (2017) case study of tupelo honey production, an NTFP, in rural northwest Florida, illustrates another example of creative conflict resolution. In Florida's honey industry, conflict surrounding tupelo honey production is high across beekeepers, honey harvesters and producers, private landowners, commercial suburban developers, and public land managers.

Watson identified several contributing factors that assisted in the conflict across forest managers and forest-dependent stakeholders. These factors were: invasive pests and disease, land use change and development, and safe and productive placement for beehives. While these factors have limited tupelo honey production, they have also "increased the need for beekeepers to access and use public lands" (p. 337). Yet, beekeepers have faced difficulty when trying to access public lands, from negotiating permits and being granted access to public

sites to combating conservation or restoration efforts already prescribed in the local forest management plan. Thus, it is important for forest managers to understand the intricacies of balancing the management of "national forests under multiple-use goals for a diversity of disparate stakeholders" (p. 341). Moreover, it is helpful to recognize how "[t]he current structure of public land management effectively limits the ability of some stakeholders to participate in the goals and outcomes of forest management" (p. 341).

Therefore, forest managers can work to recognize the importance of NTFPs and the knowledge that local forest communities have regarding forest resources. Forest managers can find ways to empower and cooperate with local forest communities to foster "new possibilities in resource management" (p. 342). Additionally, conflict can be reduced when communication across forest managers and local users is increased, as well as when "long-term goals of public land managers and the needs of local resource users" (p. 342) are in congruence.

## Conclusion

This chapter explored how the Forest Service can work to seek better local engagement, coordination, and involvement of local communities. For example, decisions about timber production included a focus on forest restoration and wildland fire rehabilitation. Decisions about forest restoration were successful when ongoing communication from the Forest Service to the community and from the community to the Forest Service occurred. Decisions about water were beneficial when made in collaboration with stakeholders of local watersheds. Decisions about biomass, including the removal of biomass to reduce wildland fire hazards, utilized input from local forested landowners. The study by Alpizar et al. (2017) on incentivizing pro-social conservation efforts and the request by Ferranto et al. (2012) to educate all forested landowners may provide helpful information for design of biomass removal and land conservation used by local forest communities. Lastly, decisions concerning recreation and other land use included understanding how policy, population and urbanization, and forestry and agriculture influence land use. The incorporation of environmental awareness with knowledge of the region's historical and emerging values may provide some insight into how Lassen and Modoc communities determine their forest ecosystem service interests.

Additionally, this section explored how different user groups form and attach social, cultural, and economic values to their forested lands. These values often related to the communities' interest in and knowledge of their forests. In California, demographic trends have shifted, resulting in an influx of new forested landowners, but with a decrease in the size of their properties. Long-time forested landowners are moving away or dividing their land, allowing new residents to move to rural areas. These shifts have led to values less centered on vegetation and land management, and instead toward values focused on amenities, natural beauty, and land conservation.

Furthermore, this chapter examined how government land management agencies, in partnership with local communities, have conducted a variety of restoration and habitat improvement projects. Forest management collaborative efforts have proven beneficial when the input from stakeholders and local communities was integrated into project plans. Part of these collaborative efforts included the management of wildland fire and discovering ways to help engage communities in fire-prone areas surrounding wildland fire hazard reduction and how to use fire as a management tool. These collaborative efforts have returned several co-benefits to the forested communities, including ways to protect their properties, increase their forest resilience to periodic wildfire, and reduce the overall intensity of wildfire in their areas.

This chapter may serve as a tool to increase understanding of how the Forest Service can engage with and sustain the livelihoods of residents in the Lassen-Modoc area by working with the community, and, in return, how the local community can participate with the Forest Service. These collaborative systems could include input from stakeholders and local communities that are invested in their land and in the ecosystem services provided by the land. Community collaboration can help local and Federal land management agencies create information, education, and processes that may be more likely to resonate with local uses and, therefore, be more successfully enacted.

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