

Effective Community Responses to Wildfire Threats: Lessons From New Mexico

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National policies to address the wildfire threat in the United States place emphasis on community responsiveness, but great uncertainty surrounds the scope and success of community response to wildfire threats and why some communities foster effective responses while others fail to do so. Two case studies of community responses to wildfire threats in New Mexico are explored. A decision process framework illustrates how an effective response can be defined. Findings indicate that an effective community response to wildfire means that a community works through all stages of the decision process with appropriate social and structural responses to its specific threat.

Keywords community response, decision process, New Mexico, Ruidoso, Santa Fe watershed, social response, structural response, wildfire threat

The wildfire threat facing communities in the Western United States is undisputed. Fire suppression policies, increases in population in the inland West, and the appeal of living in closer proximity to public lands have created situations that expose more people, property, and infrastructure to the risk of wildfire than at any time in recent history (USDA Forest Service 2000; USDA and USDI 2000b; GAO 1999a; 1999b). Over the past decade, scores of lives have been lost, tens of thousands of square miles of land have been burned, and thousands of homes and other structures have been destroyed from the damage inflicted by wildfire. In 2002, nearly 7 million acres were impacted, making it one of the most expensive fire seasons on record at a cost of \$1.6 billion dollars for fire suppression alone (National Interagency Fire Center 2003a). In 2000, 8.4 million acres burned and cost the nation \$1.3 billion in suppression costs (National Interagency Fire Center 2003b). Projections for wildfire threats are not expected to abate at any time in the near future and may increase, especially in the face of a changing climate that will increase the probability of drought and high winds in the West (McCarthy et al. 2001). An estimated 60–100 million acres of

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public lands and hundreds, if not thousands, of communities in the public lands interface are estimated at risk (GAO 2001).

Great uncertainty surrounds the scope and success of community responses to wildfire threats and why some communities manage to foster effective responses to wildfire threats while others fail to do so. In the last decade a natural experiment has occurred in the inland portion of the western United States as communities have taken different approaches to respond to the threat of wildfire. This article explores community responses to wildfire threats in New Mexico.

Trends in Community Responses to Wildfire Threats

Responses to wildfire threats can occur through structural and/or social measures. *Structural responses* to wildfire disasters focus on tangible aspects of response such as building materials that can withstand fire, vegetation management programs, greenbelts, building codes, land use regulations, zoning, insurance, taxes, public education programs and evacuation plans, buffer zones, fuel modification programs, and warning systems for predicting and tracking fires to assist in evacuation (Cigler 1988). *Social responses* entail better decision making, organization, management, and planning techniques that help communities assess, support, and choose among structural responses. Even though science, technology, and engineering have provided a wide range of structural options for reducing vulnerability and increasing resilience to wildfire disasters (Gardner and Cortner 1988; Cortner et al. 1990), lives are lost and property is destroyed in spite of these scientific and technological advancements. Increasingly there is growing recognition that effective responses to wildfire threats involve better decision making, organization, management, and planning.

Until the late 1980s, responses to natural disasters focused mostly on post-disaster structural changes and included rebuilding and relocating people and structures. In contrast to reacting to natural disasters through structural postevent response, more emphasis in recent years has been placed on loss reduction through social measures, including response planning, preparedness, and recovery planning (Cutter et al. 2000). Recent trends toward measures that focus on these social responses mean that there is greater reliance on local communities to take action.

A great paradox in natural hazards management is that social response is difficult to motivate at the local level, yet this is the level that exercises greatest control over managing the risks of natural hazards (Burby and May 1998; May and Williams 1986). State and federal agencies often are more concerned about risks pertaining to natural hazards since they bear the costs, and there is greater probability of an event occurring within a broader geographic area that sensitizes state and federal agencies to these risks. As a consequence there has been a disproportionate focus on state and federal level policies to induce action at the local level without ample attention to what actually happens at the local level.

Current national policy in the form of the National Fire Plan and Western Governor's Association (WGA) 10-Year Strategy places a priority on community-based efforts to address the wildfire problem in the West (USDA and USDI 2000a; WGA 2001). These national policies identify four common goals for wildfire management to address the long-term threats posed by wildfire: (1) improving fire prevention and suppression; (2) rehabilitating and restoring fire-adapted ecosystems; (3) reducing hazardous fuels; and (4) promoting community assistance. With these goals in mind, communities are urged to thin, conduct controlled burns, restore

forests, suppress fire, create defensible space around homes and communities, undertake public education about wildfire, and create markets for and skilled workforces capable of removing and processing small-diameter timber and forest restoration by-products to respond to this complex issue.

There are multiple, often conflicting goals at the national level for wildfire policy (Gorte 2003). These national goals are worked out in practice in particular contexts as they apply to specific problems at the community level (Cheng and Cortner 2003). Consequently, social and structural responses to natural hazards at the local level take diverse forms in different communities (Berke 1998), and there are vast differences across communities in terms of social capacity to respond (Cigler 1988). Therefore it is less important to identify the specific variables (e.g., hazardous fuel reduction programs, emergency management services systems, number of fire-fighters, public education campaigns) that correlate with an effective response, since these will vary considerably from community to community, than it is to identify processes that allow various combinations of variables to work effectively in each situation. The challenge for communities is to craft effective responses, but little is known about what is being accomplished on the ground to respond to the threat of wildfire, what combinations of social and structural responses are used at the community level, and what constitutes an effective community response to wildfire threats.

The premise of this article is that communities that create effective responses have developed functional decision processes. In policy terms, a functional decision process is composed of seven interdependent stages including intelligence, prescription, promotion, invocation, application, evaluation, appraisal, and termination (Lasswell 1971; Lasswell and McDougal 1992). An effective community response to wildfire means that a community works through all aspects of the decision process with appropriate social and structural responses to its specific threats. Each community will select from a different subset of objectives depending on the problems it faces, but in each case the degree of efficacy will hinge on the soundness of the overall decision process to carry out each individualized plan of action. Consequently, an effective response consists of the soundness of the processes used to arrive at the specific social and structural components and will take on the unique character of the community that pursues it.

The Decision Process

Each community, defined as the politically relevant participants needed to address a given problem (Lasswell and McDougal 1992), will identify problems, goals, and alternatives according to the participants, perspectives, situations, resources and strategies germane to its unique situation. A *decision process* is a means for addressing a problem to clarify, and perhaps secure, the common interest of a given community (Clark and Brunner 1996). In contrast to other theorists about decision sciences and the policy process, Lasswell conceives the decision process as a heuristic. This heuristic is a theory of process that facilitates understanding a given decision, rather than a theory of prediction about what will happen within a decision. The elastic nature of the decision process categories allows the heuristic to be applied to any decision to understand what has or has not been accomplished, thereby making it a suitable choice for understanding past as well as ongoing decisions. A key outcome from the decision process is the prescription, or the new rules or norms, developed to address the given problem. These new rules or prescriptions are

reflections of community expectations for action. Ideally, the community to which the prescription applies will follow the new rules and norms. In addition to the creation of new rules or norms, the decision process also entails other functions that lead up to, support, and allow for improvement in the prescription. As such, the decision process can be conceived as seven nonlinear, overlapping activities—intelligence, promotion, prescription, invocation, application, appraisal, and termination. Every decision process includes seven decision functions, even though they may or may not be carried out explicitly (Clark 2002).

Intelligence includes the “gathering, processing and dissemination of information for the use of all who participate in the decision process” (Lasswell 1971, 28). Dependable and appropriately comprehensive information is important to effective decision making. Intelligence leads participants to identify a given problem as a problem, as well as goals, and potential alternatives for addressing the problem. *Promotion* “is the function of recommending and mobilizing support for policy alternatives” (Clark 2002, 61). Promotion includes the dissemination of value demands and should include open and active debate about the problem definition and alternatives for addressing it. As demands are clarified through promotion, expectations for action also are established. *Prescription* includes the new rules or norms generated to address the problem and the stabilization of expectations in how the problem will be addressed. “To prescribe is to clarify and articulate the basic goals and norms, or values, of the community” (Clark 2002, 63). Specific policies are crafted as prescriptions and those with authority and control over the new rules approve them. A prescription is effective when people in a community hold common expectations about what will be done and who will do it. *Invocation* is “the act of characterizing a concrete situation in terms of its conformity or nonconformity to prescription” (Lasswell 1971, 29). If prescription is the establishment of new policy, invocation is the initial attempt to characterize the specific rules and norms so they can be followed. *Application* is the “final characterization of concrete circumstances in terms of prescription” (Lasswell 1971, 29). Application is the final attempt to characterize enforcement if there are departures from the newly established norms and rules. Application entails specifications of who is held accountable, who enforces the rules, details about how conflicts are resolved, and the sanctions applied if violations occur. The *appraisal* function assesses the entire decision process to evaluate whether specific prescriptions have been successful in achieving their goals. Appraisal characterizes the “aggregate flow of decision according to the policy objectives and identifies those who are causally or formally responsible for successes or failures” (Lasswell 1971, 29). *Termination* cancels a prescription. It may repeal a prescription entirely or it may include adjustments to the original prescription (Clark 2002, 69). Termination deals with the claims put forward by those who acted in good faith when the prescriptions were in effect and who stands to suffer when they are ended.

Methods

This research explored community responses to wildfire threats in New Mexico. A state-level analysis of wildfire risk to communities and their responses was conducted to identify the most responsive and the least responsive communities in New Mexico. The population targeted for the study is the intersection of communities that face a high level of wildfire risk and are located in the wildland urban interface adjacent to U.S. Forest Service (USFS) lands. New Mexico State Forestry (NMSF)

prioritized the “Twenty Most Vulnerable Areas” for treatment in terms of wildfire threats, and these served as the population within New Mexico that faced a high level of wildfire risk. For the purposes of the project, the total amount of monies secured through the National Fire Plan (NFP) Community Assistance Programs in these 20 communities in fiscal years 2001 and 2002 were used as a proxy to assess the degree of responsiveness in the 20 communities. While more precise measures of community responsiveness may exist, this was the only data set available that allowed a standardized comparison over the entire state. In New Mexico, NFP Community Assistance Programs provide incentives for communities to address their wildfire threat through five grant programs: (1) Twenty Communities Cost-Share Program, which supports hazardous fuel reduction on private land; (2) Economic Action Programs, which develop economic opportunities related to traditionally underutilized wood products; (3) Volunteer/Rural Fire Assistance, which improves firefighting capabilities of volunteer and rural fire departments; (4) Four Corners Sustainable Forest Partnerships, which promote community development through forest restoration; and (5) Collaborative Forest Restoration Grants, which support projects to restore forests on public lands. Ruidoso was notable in securing the largest amount of grant monies in New Mexico, while Santa Fe was distinguished by the relatively small amount secured.¹ Ruidoso was funded \$1,331,975 through

TABLE 1 NFP Grants and Dollars Received by New Mexico Communities 2001/2002

New Mexico community	Number of NFP grants received for 2001/2002	Amount of NFP grant dollars received for 2001/2002
Moreno Valley	1	\$25,000
Jemez/La Cueva	2	\$38,000
Santa Fe Watershed	1	\$50,000
Angel Fire/Black Lake	2	\$60,000
East Mountains	4	\$265,000
Capitan/ Lincoln	1	\$300,000
No. Rio Arriba	5	\$341,550
Pecos	6	\$350,628
Cloudcroft	3	\$394,838
Middle Rio Grande Bosque	5	\$581,300
Red River	7	\$585,400
Mayhill/Timberon	5	\$688,962
Gallinas Watershed	7	\$746,000
Taos Canyon/Shadybrook	4	\$752,992
Espanola Bosque	4	\$793,958
Catron County Interface	7	\$872,900
Mora County Interface	7	\$884,210
Silver City Area	10	\$1,349,655
Manzano Mountains	9	\$1,418,400
Ruidoso	16	\$2,274,674
Totals	106	\$12,773,467

Note. Compiled from coop fire prevention specialist (USFS) Elaine Waterbury (e-mail 2002) and Resource Protection Bureau, NMSF, Fred Rossback (e-mail 2002).

NFP Community Assistance Programs in fiscal year 2001. In fiscal year 2002, Ruidoso was allocated \$942,699 in these grants, for a total of \$2,274,674 as indicated in Table 1. In contrast, Santa Fe has used the NFP Community Assistance Programs on a limited basis. In fiscal years 2001 and 2002, Santa Fe was funded only \$50,000 through NFP Community Assistance Programs.

To understand the effectiveness of community responses, a case study of decision processes in each community was created (Yin 1994). Various data collection techniques were employed to facilitate the construction of each case study. The data collection entailed archival document collection and telephone interviews prior to site visits to each community. During the site visits, the authors engaged in in-person interviews, document collection, photographic documentation, participant observation, and on-site tours. Site visits to Ruidoso took place on 23–26 September 2002 and to Santa Fe Watershed on 5–11 January 2003. Interviews for the Ruidoso case study were recorded from notes taken by the two authors, written up after the completion of the interview, and returned to each interviewee for verification. Interviews for the Santa Fe case study were tape-recorded, transcribed, and returned to each interviewee for verification. Additional document analysis and follow-up telephone and e-mail interviews assisted in clarification of data collected. The documents, interview transcripts, and photographs are kept on file with the authors.

For the purposes of this article, only hazardous fuels reduction policies are covered. The other goals included in the NFP and WGA policies are not addressed. For more information about the additional goals of the NFP in Ruidoso and Santa Fe, please refer to the research web site, <http://www.wildfirecommunities.ncsu.edu>.

Community Response to Hazardous Fuel Reduction in Ruidoso, New Mexico

Located in southeastern New Mexico, the village of Ruidoso is a picturesque mountain community surrounded by the Lincoln National Forest. The area has a permanent population of about 8500, which increases to three times that amount during the summer months (interview, Ruidoso urban forester Rick DeIaco 2002). Small vacation cottages, rustic homes, and grandiose starter castles pepper the steep, winding, and heavily wooded canyons that place the community at risk of wildfire. According to the U.S. Bureau of the Census, over 43% of the homes in Ruidoso are seasonally occupied. The average household income is \$35,626 and the average home value is \$106,544 (U.S. Census 2002a). At an elevation of 6900 ft, Ruidoso is located in ponderosa pine forests with an understory of pinon–juniper, gambel, and shrub oak.

Intelligence

The status quo policy in the late 1980s with respect to hazardous fuel reduction was a Ruidoso Village Council ordinance that required a permit and a \$5 fee to cut down any tree larger than 5 inches in diameter (interviews: Capitan District Foresters NMSF Barbara Luna 2002 and Bill Duemling 2002). At that time, many Ruidoso residents felt the aesthetic value of trees was worth protecting and little challenge was made to the ordinance. In the 1990s the wildfire risk increased and residents wanted to reduce hazardous fuels to make their property safer, but were prohibited by the process and expense imposed by the tree ordinance. In 1995, a group of approximately 10 concerned citizens created the informal “Forest Health Coalition” to share

information and address the growing wildfire threat facing the community (interviews, Luna 2002 and Duemling 2002). As recalled by one of the members of the Forest Health Coalition, the process was not easy: “[We] appeared before the City Council to make our argument, but the mayor had written the 1988 ordinance and [was] opposed to having anything done and didn’t see the need to have anything done” (interview, John Morton 2002). But in 1996, conditions began to change. “In 1996 Ruidoso was ranked as having a great fire hazard. A USFS team came to Ruidoso to evaluate the risk and found that there were not adequate escape routes, no emergency planning and poor communication” (interview, John Morton 2002). In the spring of 1996 the Forest Health Coalition was successful in changing the tree ordinance and homeowners were allowed to thin any vegetation within 10 ft of their home. The change stated that thinning could take place on a person’s property but they must maintain 40 ft² of basal area unless there were disease or insect problems. Permits were required to cut trees over 10 inches in diameter (interviews, Luna 2003 and DeIaco 2003).

On account of the prevalent wildfire threat, officials and community residents realized they needed to take additional measures to confront the risks (interview, John Morton 2002). “After reading the 1999 GAO Report on Western Forests which discussed the issues of increasing wildfire risk in western forests, [Coalition members] decided to lobby the Village to take more action” (interview, DeIaco 2002). In November 2000, with continued pressure from the Forest Health Coalition, Ruidoso hired its first urban forester. A full-time urban forester was imperative for Ruidoso to address its wildfire threat because “You need someone full time who can get things done—you need someone to coordinate” (interview, DeIaco 2002).

In spite of its gains, in 2000 Ruidoso started experiencing wildland interface fires and losing houses. In May 2000 the Cree fire burned 6500 acres, destroyed 3 homes, and forced hundreds of residents on Ruidoso’s east side to evacuate their homes (interviews, Luna 2002 and Duemling 2002). During June 2001, the Trap and Skeet fire burned 463 acres on Ruidoso’s west side (interview, DeIaco 2002). Due to the prevailing threat, “Ruidoso was named the most at risk community in New Mexico by the New Mexico State Forestry and the second at risk in the nation by the U.S. Forest Service” (interview, DeIaco 2002). As if to underscore this continuing threat, the Kokopelli fire burned almost 1000 acres and overran a subdivision, destroying 29 structures, in March 2002 (interviews: DeIaco 2002; Luna 2002; Duemling 2002).

Promotion

Ruidoso Wildland Urban Interface Group (RWUIG) is the main coordinating entity to address and promote alternatives for the wildfire risk facing Ruidoso. The group was started in November 2000 by New Mexico State Forestry and is coordinated by the village of Ruidoso’s urban forester (interviews: Luna 2002; Duemling 2002). RWUIG replaced the more informal Forest Health Coalition as the driving force to address the wildfire threat in Ruidoso (interviews: Luna 2002; Duemling 2002). RWUIG is composed of members from federal, state, and local entities from the public, nonprofit, and private sectors. RWUIG has prioritized areas for treatment in the southwest region of Lincoln County and is targeting the southwest-side communities as the first line of defense. The RWUIG meets on a monthly basis and serves as a forum to share perspectives, provides a regular point of multilateral contact among diverse members who otherwise might interact only on an ad hoc or bilateral basis, and “gives us the ability to see the big picture” (interview, Lincoln County Manager Thomas Stewart 2002).

Prescription

There are two initiatives geared to help Ruidoso reduce hazardous fuels. The first is a municipal program called the Community Forest Management Plan that allows the urban forester to meet with residents, assess the property, and recommend how to make the property more wildfire safe (interviews: Luna 2002; Duemling 2002). The municipal homeowner assessments emphasize three different elements: (1) fire protection/hazard reduction, (2) landscape opportunities, and (3) forest health, depending on the preference of the homeowner. The goal of the municipal program is to treat 13,000 acres within Ruidoso to a ground fire standard, which is designed to keep a fire on the ground and reduce the risk of a wildfire spreading into the trees. To complete the entire 13,000 acres will take approximately 6–8 years (interview, DeIaco 2002). In addition to the policies to reduce hazardous fuels on private property, Ruidoso created a municipal management plan to thin forested areas on 638 acres of property that abuts the USFS wildland interface (interview, DeIaco 2002). The plan includes two project areas—Grindstone and Eagle Creek. The Grindstone project began in October 2001 and treated 185 acres surrounding Grindstone Lake, which is one of the main sources of water for Ruidoso. The 438-acre Eagle Creek project began in October 2002 and combines hazardous fuels reduction with restoration work. In addition to the municipal projects, Ruidoso has worked with the U.S. Forest Service to create a 13-mile fuel break around the town. The current most vulnerable site on USFS property is adjacent to Eagle Creek, comprising some 6000 acres. Contracts were let for this work after 1 October 2002.

The second major initiative to help Ruidoso reduce hazardous fuels is through New Mexico's Twenty Communities Cost-Share Program, which allows private landowners to thin on their property at a reduced cost (interviews: DeIaco 2002; Luna 2002; Duemling 2002). National Fire Plan monies support New Mexico's Twenty Communities Cost-Share Program and are passed through the state to cities, towns, or counties to help defray costs to create defensible space around homes, thin forested private property, and promote overall forest health. Through this program homeowners can be reimbursed up to 70% of the maximum reimbursement rate per acre set by NM State Forestry Division. The standard for the State program is for crown fire protection and is more aggressive than Ruidoso's municipal program.

Invocation

To help implement the municipal hazardous fuels reduction program, the Ruidoso Village Council passed a mandatory fuels management ordinance in June 2002 (interview, DeIaco 2002). Several years of work laid the foundation for the ordinance to pass. A community-led Forest Task Force devised the ordinance and worked with the Ruidoso Planning and Zoning Committees and the Ruidoso Village Council, but good timing also played a role. "The night [the ordinances] were brought before the Village Council the smoke from the Rodeo-Chedeski Fire in Arizona blew through town, which contributed to the ordinances passing" (interview, DeIaco 2002). The smoke from the Arizona fire coupled with the recent and more local Kokopelli fire resulted in political support for the ordinances. In total four ordinances were passed. The first ordinance addresses new construction by requiring ignition-resistant building materials and fuels management based on a rating system. The second ordinance is a wildland hazard overlay district. The third outlines fuels management on all Ruidoso property along with updating and consolidating all the fire

regulations. The fourth revamped and formally codified the existing tree ordinance (interview, DeIaco 2002). Ruidoso is the first municipality in New Mexico to adopt such far-reaching wildfire protection codes.

An additional consideration in implementing hazardous fuels treatment in Ruidoso has been slash and debris removal. "It was important to have in place a system for removal if people were going to be willing to treat their property" (interview, DeIaco 2002). The Forest Health Coalition initially pushed for a process to pick up limbs and needles in 1998, and Ruidoso officials came up with the idea of a grappling truck to facilitate the removal of debris in 1999, when they purchased their first grappling truck (interview, Morton 2003). Coordinated through the Ruidoso Solid Waste Department, the truck makes rounds to neighborhoods on a scheduled basis to remove debris cut by residents. To accelerate removal of debris in conjunction with the passage of the new ordinances Ruidoso has purchased three additional grappling trucks.

The implementation of the municipal property fuels reduction projects has been coordinated by the urban forester. The Grindstone project was funded through the USFS and carried out by local contractors to do the thinning. Completed in January 2002, the prescription included multistory treatment and cutting trees up to 12 inches in diameter with 9–27 feet spacing between trees. Firs and junipers were favored as leave trees because of dwarf mistletoe, *Ips*, and *Dendroctenous* bark beetle problems in ponderosa pine (interview, DeIaco 2003). The project cost \$87,875, approximately \$475 per acre, to treat (interview, DeIaco 2002). The Eagle Creek project was funded in 2001 through a Collaboration Forest Restoration Program grant in the amount of \$335,852, at a cost of \$563 per acre (interview, DeIaco 2002). The project enlists schools to help with monitoring work. Slash and small-diameter timber will be utilized where accessible. Contractors wishing to collect personal-use timber or firewood will utilize wood greater than 5 inches in diameter. Slash material less than 5 inches in diameter will be burned in piles or transported to a compost facility where possible.

The Twenty Communities Cost-Share Program was administered by the South Central Mountain Resource Conservation and Development Council (RC&D) in 2001, but in 2002 administration was transferred to Lincoln County (interview, Stewart 2002). NMSF wanted a full government entity to administer the grant, and RC&D is a quasi-governmental agency. NMSF is unable to administer the program due to a state anti-donation clause that prohibits it from directly distributing money to private landowners. Lincoln County, working through NMSF, reimburses homeowners up to \$750/acre for heavy thinning on their property and up to \$1700/acre for heavy defensible-space work (interviews: Luna 2002; Duemling 2002).

Application

Once the disposal system is geared up (with the purchase of additional grappling trucks) to handle the larger amount of residue coming off homeowner property, Ruidoso will begin to fully enforce the ordinances. "We don't want to be in a position where we have people thinning their property and no way to pick it up. This gives them an excuse to delay" (DeIaco 2002). The enforcement will start on the southwest side of town, the area prioritized for fuels treatment by RWUIG. Ruidoso anticipates three type of people: (1) those who comply, (2) those who can't thin because they are physically or financially unable (a volunteer program is being developed through the schools, churches, and community service organizations to

help the people in this group), and (3) those who won't thin because of various issues—for these people the village will hire a contractor, thin the property forcibly, and bill the property owner or place a lien on the property (interview, DeIaco 2002).

For the Twenty Communities Cost-Share Program, Lincoln County is in the process of hiring a grant administrator whose duties include enforcing the Twenty Communities Cost-Share Program (interview, Stewart 2002). One of the challenges in the implementation of the Twenty Communities Cost-Share Program is in making sure that property owners who have applied for reimbursement carry out their plans. If property owners do not follow through, then Lincoln County is caught in a position where monies are committed but work is not completed. The county manager plans to enforce vigorously the program to ensure landowners are actually accomplishing what they have contracted to do and to ensure the monies committed actually get used (interview, Stewart 2002).

Appraisal

As of April 2003, the Ruidoso Wildland Urban Interface Group projects have created 6027 acres of buffer zone on public land and 805 acres of defensible space on private land (DeIaco e-mail 2003). The biggest accomplishment for Ruidoso has been its own municipal program. Ruidoso had the political support and foresight to hire an urban forester who coordinates and conducts a village-wide hazardous fuels reduction program, pass village-wide ordinances to support widespread hazardous fuel reduction, and impose building codes to reduce future wildfire risks. In addition to these municipal achievements, a more comprehensive response to the wildfire threat in Ruidoso is conducted through the Ruidoso Wildland Urban Interface Group. Ruidoso's continuing progress in hazardous fuels reduction around interface areas highlights the collaboration and cooperation of RWUIG members. The year 2002 was the second season for the Twenty Communities Cost-Share Program for RWUIG. With these monies, members have completed projects that abut USFS property within Ruidoso and lands that adjoin the neighboring Mescalero Reservation. They funded over 300 projects with the 2001 grant money, and the 2002 projects are underway, but not yet completed (interviews: Luna 2002; Duemling 2002).

Termination

The RWUIG meets monthly to revisit and update its current policies and plans of action. Periodically, plans are revised to meet changing needs. The Grindstone municipal project is completed and thus terminated, but the Eagle Creek project, the municipal homeowner assessments, and the private property program continue, as does work with USFS to treat the buffer surrounding Ruidoso. Likewise, the Twenty Communities Program continues to be implemented. To date, these major prescriptions dealing with hazardous fuels reduction have not been terminated.

Community Response to Hazardous Fuel Reduction in Santa Fe, New Mexico

Santa Fe is a medium-sized city of over 70,000 people located in north central New Mexico. According to the U.S. Bureau of the Census, the median home value in 2000 was \$187,182 with 5% of the homes occupied seasonally and a median household income of \$42,624 (U.S. Census 2002b). A high desert region, Santa Fe sits at 7000 feet in elevation bordering the Sangre de Cristo Mountain Range to the east and

receives only 14 inches of rain each year. The surrounding area is comprised of a variety of forests with pinon-juniper transitioning to ponderosa pine which transitions to mixed conifer. The city is headquarters for several environmental groups that are vigorous in their efforts to preserve public lands and environmental values.

Intelligence

Northeast of the city is the Santa Fe Municipal watershed, an almost entirely uninhabited site closed to all public use. In the watershed, the Santa Fe River flows through the Pecos Wilderness to fill two reservoirs, Nichols and McClure, which supply Santa Fe with approximately 40% of its water (USDA Forest Service 2001). Today the watershed is densely overpopulated with ponderosa pine, white fir, and douglas fir.

The density of trees (approximately 500 to 1000 per acre) in the Santa Fe Municipal Watershed places it at risk from catastrophic wildfire, especially during drought conditions, which have been prevalent in the last few years (USDA Forest Service 2001). In 2000, two large fires, the Viveash and Cerro Grande, occurred near the Santa Fe Municipal Watershed. In 2001, 100 acres burned in a drainage in the wilderness on the east side of the Municipal Watershed (interview, USFS silviculturalist Regis Cassidy 2002). A large stand-replacing fire likely could cause heavy flooding into Santa Fe, move soil, mud, and woody debris into the canyon bottom and reservoirs, damage or destroy homes, habitats, and the drinking-water supply, spread fire into residential and developed recreation areas, and infiltrate smoke into urban areas, resulting in health problems (USDA Forest Service 2001). The greatest risk from wildfire is the sedimentation and erosion that would fill the reservoirs, thereby compromising the short- and long-term water supply of Santa Fe. In addition to the risk posed to the water supply, the overly dense vegetation suppresses herbaceous plants, reducing biological diversity and compromising soil stability.

In 1996 the Director for the City of Santa Fe Water Department made the connection between the wildfire threat in the watershed and the threat to the city's water supply (interview, hydrologist Amy Lewis 2003). Out of the 17,520 acres encompassing the Municipal Watershed, the Santa Fe National Forest (SFNF) is responsible for 15,493 (USDA Forest Service 2001). Half of the SFNF acreage is located in the Pecos Wilderness, where thinning is banned, and therefore off limits to any treatment. The City of Santa Fe owns an additional 1124 acres in the watershed, with private and nonprofit entities like the Randall Davey Audubon Society and The Nature Conservancy owning the remaining acreage (Deputy District Ranger Maria Garcia e-mail 2002). The USFS had been reluctant to address the wildfire problem in the watershed (interviews: Santa Fe Watershed Association executive director Paige Grant 2003; Lewis 2003). In 1997, the city of Santa Fe, in conjunction with the USFS, funded a study within the watershed to begin a baseline assessment of the conditions in the area (interview, Lewis 2003). The existing conditions report describes the condition of the forest as a monoculture of ponderosa pine with tree densities that made the forest vulnerable to catastrophic fire and disease. Later that year, the Santa Fe Water Department Director delegated the task of addressing the wildfire risk to one of his hydrologists, who started a collaborative process. "I got the Sierra Club, Audubon Society, The Nature Conservancy, [Wild Watershed] and a bunch of foresters in the same room and said, 'let's talk about this'" (interview, Lewis 2003).

Promotion

The Santa Fe Municipal Watershed Project (SFMWP) has been the main focus for addressing the wildfire problem in the watershed. The creation of the SFMWP began in 1998 with the National Environmental Policy Act (NEPA) processes that entail the preparation of an Environmental Assessment (EA). The USFS, under the direction of Santa Fe National Forest NEPA officer, coordinated the process to create the SFMWP. Picking up where the City of Santa Fe Water Department left off, “[The NEPA officer] started an outreach process she called the Partners Group to get community groups, environmental groups and other agencies to come and sit in with Santa Fe National Forest official on the process of considering the Existing Conditions Report and making action plans that fell out of that” (interview, Grant 2003). The Partners Group met on a monthly basis while the Draft EA was prepared. To promote discussion of various alternatives for addressing the wildfire issue in the watershed there were monthly public tours to the project areas sponsored by the City of Santa Fe and the Santa Fe Watershed Association (SFWA), the creation of demonstration treatments sites, a large community forum that included a panel of well-known forest ecologists, meetings with city residents living near the Watershed, and preparation and distribution of a brochure and web site about the proposed alternatives to Santa Fe residents (USDA Forest Service 2001). According to the Santa Fe Watershed Association Executive Director, there was “genuinely open discussion” during the process (interview, Grant 2003). In June 2000 the SFWA, in partnership with the SFNF and others, organized a forum to address scientific issues related to wild and prescribed fire. Soon thereafter the EA process was converted to the development of a full Environmental Impact Statement (EIS). During this time, the city sponsored walking tours through the watershed (SFWA 2003). The Partners Group had a definitive impact on the EIS and among other things added a monitoring component, incorporated demonstration plots, and changed the objective from concern about water quantity and water quality to focus only on water quality (because of the perverse incentive water quantity could have provided for cutting additional trees). As one environmental participant recalled, “I was actually stunned by the level to which the Partners had an impact on the process. We definitely changed the outcome with our presence” (interview, Grant 2003). Another environmentalist recalled, “I think we all saw this watershed project as an opportunity to really be the poster child. The Forest Service to their credit probably gave more public participation work on this project than any other project that I’ve been involved with” (interview, NM Audubon executive director David Henderson 2003). The NEPA officer’s role in the SFMWP ended with the completion of the EIS and the Partners Group was disbanded (interview, Lewis 2003).

A small but vocal minority of environmental groups continued to oppose the SFMWP, even though they refused to participate in the process to develop the SFMWP. Characterizing his own role in the process, one of the more extreme environmentalists commented, “There’s a role in any political debate for an uncompromising stance” (interview, executive director, Wild Watershed, Sam Hitt 2003). Wild Watershed, Forest Conservation Council, and Santa Fe Forest Watch remained dissatisfied with the EIS process and appealed it. The majority of other environmental groups that did participate in the SFMWP process continued to support the project (interviews: Garcia 2002; Grant 2003; Henderson 2003). According to one of the more moderate environmentalists, “[Wild Watershed] doesn’t like the Forest Service, so [their] first reaction is to oppose anything that [the

Forest Service does]. To be critical of [Wild Watershed], [they] didn't participate in the process. And that's not our style with something that's in our backyard" (interview, Henderson 2003). The appeal was based on an ineffective monitoring strategy of management indicator species, as mandated through the National Forest Management Act (interviews: Hitt 2003; Forest Conservation Council executive director John Talberth 2003). On 10 January 2002, The Forest Service Appeals Deciding Officer upheld the decision and denied the appeal (Garcia e-mail 2002). While Forest Conservation Council and Santa Fe Forest Watch dropped their opposition to the project, Wild Watershed continued to threaten stoppage of the project through legal means (interview, Hitt 2003).

Prescription

The prescription agreed on by the various stakeholders in the EIS process is one that focuses predominantly on ecosystem restoration. The first phase entails various components: (1) No trees will be harvested commercially; (2) trees up to 16 inches in diameter will be cut and the trunks laid along slope contours to decompose; (3) trees will be cut by feller buncher, except on steep slopes where chainsaws will be used, and no new roads will be constructed nor will skidding be allowed; (4) forest canopy cover will be left in a variable-density mosaic that mimics natural fire disturbance patterns in a ponderosa pine forest; and (5) the southern ridge of the watershed will be cut into fuel breaks up to one quarter mile wide to keep erosion out of the canyon and thinned to 20–30 large trees per acre or 20–30% canopy cover. The second phase of the prescription entails burning slash piles once they have dried, approximately 3–12 months after the cutting takes place. The third phase calls for low-intensity broadcast burns to reduce density of small trees and surface fuels. The fourth phase involves annual monitoring and evaluation to determine treatment effectiveness and environmental effects (USDA Forest Service 2001). The Santa Fe Municipal Watershed Project Record of Decision and EIS were released in September 2001 with a project area encompassing 7270 acres and a target of treating 700–1000 acres per year (USDA Forest Service 2001).

Invocation/Application

Timely and accurate invocation and application of the SFMWP is the greatest challenge remaining in the Santa Fe Watershed (interviews: Grant 2003; Lewis 2003; Armstrong 2003). According to one USFS employee, "The Santa Fe Watershed project is a priority and is being funded, but its been slow in happening" (interview, small sales forester Bill Armstrong 2003). Progress in hazardous fuels reduction has been sluggish. When fuels have been reduced, there have been instances where the prescriptions laid out in the SFMWP were not followed. On several occasions workers misapplied the prescriptions due to poor oversight and project management (interviews: Grant 2003; Armstrong 2003).

While the SFMWP Record of Decision and EIS were released in September 2001, as of January 2003, only 11 acres out of the more than 7000 acres in the SFMWP had been thinned (Garcia e-mail 2003). Several factors contributed to this holdup. First, the EIS was unsuccessfully appealed upon release by a minority of environmentalists, as already mentioned. After the appeal, another delay occurred when the State Historic Preservation Office (SHPO) halted the project due to inadequate documentation of historical features (interviews: Garcia 2003; Armstrong 2003). USFS archeologists provided the additional information to ensure

that SHPO requirements were addressed adequately to allow thinning to begin in 2002. Another delay occurred when the Santa Fe National Forest closed in May 2002 due to an increased wildfire threat and did not reopen until September 2002 (interview, Garcia 2003). No thinning can take place during a forest closure. Lastly, a Montana company signed a contract in August 2002 to start work on a 760-acre site at \$945 an acre. However, previous contracts in Colorado, and then snowy weather, precluded the company from commencing work until February 2003 (Garcia e-mail 2003). The sum of \$700,000 was allocated and committed by the USFS in the 2002 fiscal year, even though the company could not complete the work, meaning this money could not be used for other thinning projects in the absence of the contracted company.

According to several people interviewed for this research project, the biggest impediment for the implementation of the SFMWP has been the absence of a project manager (interviews: Armstrong 2003; Lewis 2003; Grant 2003). One USFS employee stated that the agency was long overdue in appointing someone to manage the project: "The District Ranger should have assigned or hired a project manager during the analysis phase to oversee the Santa Fe Watershed project" (interview, Armstrong 2003). The Espanola District Ranger Office has been the coordinating entity for the implementation of the SFMWP and has been reluctant or unable to appoint a project manager to oversee the "on-the-ground details" in the watershed. Responsibility for the project is divided among several different people within the Espanola District, none of whom have a consistent or integrated overview of the project (interview, Garcia 2003).

Failure to provide consistent project management has resulted in several problems with the invocation and application of the EIS to date. Eight demonstration acres were thinned in the fall of 1999 using prison labor under the direction of New Mexico State Forestry (interviews: Armstrong 2003; Grant 2003). Cottonwoods and other riparian species were cut in one of the demonstration plots in violation of the EIS (interviews: Armstrong 2003; Grant 2003). Burning took place in the spring of 2001, instead of the fall as prescribed, resulting in the death of a large number of trees. The remaining trees, already under considerable stress, had broken dormancy and were susceptible to scorch (interview, Armstrong 2003).

The monitoring piece of the prescription also has suffered from the lack of reduction in hazardous fuels and the absence of a project manager or other coordinating entity. A monitoring plan has been proposed to evaluate progress of the prescription on an annual basis. The monitoring plan is aggressive and an important part of gaining the trust of the environmental groups. The City of Santa Fe has been responsible for installing monitoring equipment, including two stream gauges with turbidity meters in a paired watershed study (each of the tributary drainages is about 400 acres in size; one will be treated and the other left undisturbed). The Santa Fe Watershed Association has taken responsibility for invoking and applying the monitoring plan. The Technical Advisory Group (TAG) is a group of scientists with expertise in fields related to the evaluation of forest management activities in the Santa Fe Watershed. The TAG is convened by the Santa Fe Watershed Association to provide independent scientific guidance of the Santa Fe Municipal Watershed Project. Third-party peer review of monitoring and management activities in the Santa Fe Watershed by the TAG will develop and transfer reliable information on the effects of thinning and prescribed burning on ponderosa pine and mixed conifer ecosystems in the southern Rockies (SFWA 2003). The goal for this information is to help build public confidence that forest management activities can be conducted to

protect ecosystem values while reducing the danger of crown fire. The Santa Fe Watershed Association will report findings to the Santa Fe National Forest, other agencies participating in the SFMWP, and to the public (interview, Grant 2003). The USFS Rocky Mountain Research Station in Albuquerque is providing \$75,000 for half of the monitoring plan (3000 acres) and the SFWA is finding funding for the remaining portion of the plan (interview, Garcia 2003). SFWA received \$45,000 from a U.S. Environmental Protection Agency (EPA) 319 grant to cover some of the expenses associated with the monitoring plan. The grant funds \$15,000 per year for 3 years and ends in 2003 (interview, Grant 2003).

Appraisal

The USFS has developed an impressive plan to address the catastrophic wildfire risk facing the Santa Fe Watershed, but at the time this research was completed in January 2003 only 11 acres of hazardous fuel had been reduced. Highlights of the Santa Fe Municipal Watershed Project include a strong focus on restoration and a sound monitoring plan. Baseline data and monitoring stations have been established, even if the acreage has not been treated. Monitoring is set to progress as soon as treatment begins. In many ways the SFMWP is a poster child for collaboration between the USFS and the environmental community, at least in planning a hazardous fuels reduction project. The USFS created a consensus-based planning process that ultimately secured the support of the majority of the Santa Fe environmental community. However, the plan has been slow to be implemented, leaving many to wonder if the USFS has the political and fiscal will to address the problem in the short and long term. The Santa Fe Watershed Association clearly sees the USFS responsible for this lack of progress, as do others. "We need to hold the Forest Service accountable and insist on their assigning a competent project manager who can run the project according to the guidance in the EIS, so there are not valid grounds for an environmental protest" (interview, Grant 2003). Additionally, the threat of a wildfire in the Santa Fe Watershed is not a concern for many Santa Fe residents. As one neighbor stated, "In part I haven't been as much involved. It ought to probably be higher on my priority list, but it's not right now and there are other folks that tend to be more involved than I am" (interview, Henderson 2003). Residents closest to the watershed know little about the SFMWP's progress. The complacency of neighborhoods at the greatest risk demonstrates the need for education and outreach with these residents. Additional efforts by the USFS to reach residents through FIREWISE programs have been met with limited interest in the communities surrounding the watershed.

Termination

While the major prescriptions have not been terminated, they have been adjusted. Initial demonstration treatment areas in the watershed led to a reevaluation of the technologies available to reduce fuel loads in the project area (interviews: Armstrong 2003; Grant 2003). Total reliance on piling and burning would significantly slow the pace of treatment since the anticipated burn "windows" only would allow the treatment of 200–300 acres per year, far less than the annual target of 700–1000 acres in the EIS (interview, Armstrong 2003). For the SFMWP the wood must be disposed of on site since there are provisions against hauling the wood out of the Watershed. As an alternative to burning, the USFS now is pursuing a complementary strategy of "chunking" the debris and leaving it on the ground. The use of the "chunking"

TABLE 2 Social and Structural Responses in Ruidoso and Santa Fe

	Ruidoso		Santa Fe Watershed	
	Structural	Social	Structural	Social
Intelligence	<ul style="list-style-type: none"> • Tree cutting ordinances • Hire urban forester 	<ul style="list-style-type: none"> • Forest Health Coalition 	<ul style="list-style-type: none"> • Existing Conditions study 	<ul style="list-style-type: none"> • City of Santa Fe Water Department
Promotion	<ul style="list-style-type: none"> • Prioritized treatment areas 	<ul style="list-style-type: none"> • RWUIG • Urban forester 	<ul style="list-style-type: none"> • SFMWP Draft EA 	<ul style="list-style-type: none"> • Partners Group
Prescription	<ul style="list-style-type: none"> • Municipal property assessments • Municipal management plan • NM Twenty Communities Cost Share program 	<ul style="list-style-type: none"> • Urban forester • NM state forestry 	<ul style="list-style-type: none"> • SFMWP Final EIS 	<ul style="list-style-type: none"> • Partners Group
Invocation	<ul style="list-style-type: none"> • Fuels management ordinances • Slash and debris removal system 	<ul style="list-style-type: none"> • Forest Task Force, Ruidoso Planning and Zoning Committees, Ruidoso Village Council • Urban Forester, coordinated through the Ruidoso Solid Waste Department 	<ul style="list-style-type: none"> • Contract to Forest Rehab • Demonstration plots 	<ul style="list-style-type: none"> • Espanola Ranger District—ineffective program management • Espanola Ranger District—ineffective program management

	<ul style="list-style-type: none"> • NM Twenty Communities Cost Share Program private land-owner treatment • Enforcement of municipal ordinances • Enforcement of Twenty-Communities Land Owner Treatment 	<ul style="list-style-type: none"> • South Central Mountain Resource Conservation and Development Council • Lincoln County 	<ul style="list-style-type: none"> • Monitoring plan 	<ul style="list-style-type: none"> • Santa Fe Watershed Association, Technical Advisory Group, USFS Rocky Mountain Research Station
Application	<ul style="list-style-type: none"> • Monthly updates to track progress • 6027 acres treated on public lands • 805 acres treated on private land • Completion of municipal public lands projects • Other prescriptions ongoing 	<ul style="list-style-type: none"> • Urban forester • Lincoln County, grants administrator • New Mexico State Forestry • Ruidoso Wildland Urban Interface Group • Ruidoso Wildland Urban Interface Group 	<ul style="list-style-type: none"> • Enforcement of contracts, demonstration plots • Enforcement of monitoring plan • Quarterly reports from monitoring plan • 11 acres treated 	<ul style="list-style-type: none"> • Espanola Ranger District—ineffective program management • Santa Fe Watershed Association • Santa Fe Watershed Association
Appraisal				
Termination			<ul style="list-style-type: none"> • Disposal/reduction fuel loads altered to include “chunking” instead of burning only 	<ul style="list-style-type: none"> • Santa Fe Watershed Association

technique will not completely replace prescribed burning, which will still be necessary to fully restore ecosystem function (interview, Armstrong 2003).

Policy Implications and Conclusions

The case-study analysis reveals how structural and social responses to wildfire threats are used with greater and lesser effectiveness in reducing hazardous fuels in Ruidoso and Santa Fe. Structural responses in Ruidoso are evident in every phase of the decision process and include the tree cutting ordinance, an urban forester, municipal property assessments, municipal management plans, the New Mexico Twenty Communities Cost-Share program and treatments, the fuels management ordinance, the slash and debris removal system, enforcement systems for the municipal ordinance, and monthly updates on progress for all the programs. These structural responses are complemented by strong social responses that ensure the work throughout the whole decision process is initiated, executed, and completed, as illustrated in Table 2. Since the completion of the data collection in this project, Ruidoso has created its own forestry department and added a forestry technician in February 2003 to help invoke and apply the many efforts underway. As a consequence of these complementary and supportive structural and social responses, Ruidoso has completed hazardous fuels reduction work on 6027 acres of public lands and 805 acres of private property.

In Santa Fe, a different pattern is evident. While Santa Fe created sound structures in the earlier phases of the decision process, including the existing conditions study, the Draft EA for the Santa Fe Municipal Watershed Project, the Final EIS for the Santa Fe Municipal Watershed Project, contracts for hazardous fuels reduction work, demonstration plots, and a monitoring plan, these are not well supported by social structures, as indicated in Table 2. In the earlier phases of the decision process the City of Santa Fe, the Partners Group, and the Santa Fe National Forest staff worked to support the structures that could address the wildfire threat in the watershed. Failure to develop a social response, in the form of a program manager or stakeholder group to support the structural response in the invocation and application phases of the decision process, resulted in delays in the invocation and application of the prescription. Notably, the monitoring program was supported by a sound social structure, including the Santa Fe Watershed Association, the Technical Advisory Group, and the USFS Rocky Mountain Research Station. Due to difficulties in invocation and application, the Santa Fe Municipal Watershed project was able to complete only 11 acres of hazardous fuel reduction.

Since the completion of data collection with this research project in January 2003, the Santa Fe Municipal Watershed Project has made greater progress. As of June 2003, thinning was completed on 700 acres along the southern watershed boundary and piles burned on 7 acres (SFWA 2003). Concurrent with the progress in invoking and applying the prescription, the City of Santa Fe hired a wildland urban interface specialist in January 2003 to coordinate actions among diverse stakeholders and perform outreach (interview, Santa Fe Fire Chief Dave Sperling 2003). Additionally, a project implementation team was established in May 2003. The project implementation team is comprised of members from the City of Santa Fe, the Santa Fe National Forest, New Mexico Environmental Department, and Santa Fe Watershed Association. The group meets monthly to update each other,

coordinate information and activities, and troubleshoot issues to ensure the SFMWP accomplishes its objectives (SFWA 2003).

These data suggest that social responses are equally important with structural responses to address effectively wildfire threats in specific communities. Absent a social response to accompany the structural response, there is no means to accomplish the task. Moreover, social and structural responses are important in each phase of the decision process. An effective community response to a wildfire threat does not begin and end with planning a response; it must be executed and enforced. The Santa Fe response was ineffective initially due to the inability to invoke and apply the prescription that had been planned. The Ruidoso response was more effective due to the comprehensive treatment of the decision in all phases of the decision process from intelligence through termination. The decision process provides a useful framework for evaluating how structural and social responses work together in each phase to comprise an effective overall response to a community's wildfire threat.

At a time when there is great focus on the role of collaboration in wildfire management, this research suggests that collaboration may be only one form among many different types of social response that can address a wildfire threat. Social responses take a variety of forms in these two case studies. In some instances, collaborative groups provide the social response, as with the Partners Group in the Santa Fe Watershed and the RWUIG in Ruidoso. In other instances, an individual provides an adequate social response as in the case of Ruidoso's urban forester. In other words, a multilateral as well as a bilateral social response can be equally effective in accomplishing a given task. Likewise, various groups took different forms. Consider that social responses were provided by a group of concerned citizens in the Forest Health Coalition, a stakeholder group comprised of USFS employees, the City of Santa Fe employees, environmental groups, state agencies and nonprofit groups in the Partners Group, and a group of scientists and technical advisors as in the case with the Technical Advisory Group convened by the Santa Fe Watershed Association. In each case, the social response was tailored to the structural response at hand without any prescribed formula for success. Nor was any sector proprietary in establishing a social response. A city or county entity provided a social response, as with the City of Santa Fe Water Department or the Ruidoso Solid Waste Department. The federal and state government organized a social response, as with the Partner's Group and RWUIG. Private citizens organized the Forest Health Coalition. A nonprofit organization, the Santa Fe Watershed Association, organized the social response for the monitoring component of the Santa Fe Municipal Watershed Program. These two cases only begin to catalogue the diversity of social responses evident in communities taking action to address their wildfire threats. Clearly, more could be learned from additional research at the community level.

Wildfire threats to communities in the West will continue in the near and distant future. While science, technology, and engineering have provided ample structural responses to wildfire threats, much less is known about social responses and how such responses might be better promoted to complement existing structural knowledge. National policies continue to place a priority on community-based efforts to address the wildfire problem in the West, but funding mostly is aimed at fostering structural responses—building fire departments, utilization industries, fostering restoration work, and funding hazardous fuel reduction projects. If social responses are equally important, then additional attention to helping communities foster sound social responses to accompany their structural solutions also is in order.

This research suggests a diversity of approaches and strategies are used at the community level in crafting social responses. Diffusing examples of these strategies to practitioners and residents within communities, as well as to policymakers, educators, and researchers, will allow each community to craft its own response to the circumstances it faces without becoming overly formulaic. Relying on communities to identify and define their own alternatives as they build their capacity to respond to wildfire threats is the surest way to provide a long-term solution to the wildfire problem facing Western communities.

Note

1. New Mexico State Forestry prioritized the “Twenty Most Vulnerable Areas” for treatment in terms of wildfire threats, rather than the 20 most vulnerable communities. While two other areas received less money than Santa Fe, these were not distinct communities. To facilitate comparison of community responses, the research focused on identifiable communities, rather than areas.

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