

Strategies for and Barriers to Public Adoption of Fire Safe Behavior¹

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Abstract: A recent survey of people living in wildland-urban intermix neighborhoods in a portion of the Sierra-Cascade foothills identified perceptions of defensible space that block its rapid and widespread adoption. A companion survey described communication channels used by residents to acquire information about landscaping and identified opinion leadership characteristics. Neither lack of awareness of the wildfire threat, lack of basic knowledge of defensible space, nor skepticism about defensible space effectiveness were a barrier to adoption of wildfire defenses by property owners. Perceived costs and labor requirements, lack of specific knowledge about how to do the required work, lack of time or assistance to do the work, and the difficulty of disposing of large amounts of brush generated in the initial conversion to defensible space were serious barriers. Biomass harvesting was experimented with to dispose of brush and to cover some of the costs of initial conversion. Social marketing and community organization methods were used to promote and carry out the project. The approach proved effective. Results showed excellent promise for the use of biomass harvesting in thickly settled subdivisions.

In spite of years of effort to encourage the adoption of defensible space—a safe zone that protects a structure from fire—only a relatively small proportion of wildland-urban intermix residents have changed their landscapes to help protect their properties from wildfire. Even more rare are entire neighborhoods and communities protected by strategic wildfire defense preparations. The annual drama of flames, ashes, and despair broadcast on California prime-time television and featured on the front pages of newspapers from the smallest weekly to national circulation giants regularly alerts residents to the potential danger. Clearly other barriers must block widespread public adoption of wildfire defenses.

Investigations to identify these barriers began with Survival by Design workshops held at Chico and Pomona, California, in which fire management specialists presented the problem to selected community leaders who then evaluated the potential of defensible space as a “product” that wildland-urban intermix residents might adopt. A pair of surveys of wildland-urban intermix residents in the aftermath of the

“49'er Fire” were administered. The workshops and the two surveys together generated information needed to create a neighborhood-based approach to the promotion of wildfire defense preparations. This approach is now being tested in neighborhoods in high fire hazard areas in northern California.

The organization and education elements of the approach were tested on a small scale in Paradise, California with some success. A study of the potential of biomass harvesting on small private ownerships to reduce the fire hazard was proposed in the Shingletown Ridge area. The project was funded, and during the spring and summer 1992, a successful effort at neighborhood organization for hazard reduction and biomass harvesting demonstrated the potential of the neighborhood based approach, but also revealed the need for larger scale operations and planning. A proposal is currently being considered by the California Department of Forestry and Fire Protection (CDF) to prepare a wildfire defense preparations plan for an area of about 40,000 acres on the Shingletown Ridge that can be implemented through community action with assistance from National Forest Stewardship funds and other public conservation programs.

Concurrently, a neighborhood-based hazard reduction program was implemented in the Middle Creek watershed west of Redding. The approach was similar to the Shingletown area study but involved more financial commitment from property owners. The Middle Creek project began as a soil conservation and erosion reduction project designed, in part, to protect the endangered winter run salmon spawning beds. Fire defense preparations for the watershed were undertaken when it was realized that a repeat of the 1972 Swasey Fire would destroy erosion protection investments as well as burn many homes and threaten lives.

These studies showed that strategic defensible space (wildfire defense preparations) can be successfully promoted on a large scale if the idea is marketed using the natural social and communication structure of the communities, perceived barriers are removed, and neighborhood initiatives are supported.

This paper describes the barriers revealed by the survey of residents in wildland-urban intermix neighborhoods, and other barriers that impede the implementation of defensible space promotion projects. The most appropriate approach for marketing community wildfire defense preparations will also be discussed.

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From Suppression To Integrated Fire Management

One central objective of wildfire management is to minimize the sum of fire losses and costs. That objective applies to prevention and pre-suppression as much as to fire fighting. Prevention and fuels management are (or ought to be) equal partners with suppression in the management of fires to reduce as much as possible the negative impacts on people's lives and their social and economic systems. However, currently our thinking is dominated by suppression even in the case of defensible space design and promotion.

As presently conceived, defensible space is a collection of actions, including vegetation management around structures, that will provide a safe place to defend the structure and reduce the vulnerability of the structure to ignition. Defensible space includes other elements, of course, such as signing, adequate roads, and water supplies, and all are to be provided in an effort to defend individual structures easily, safely, and more effectively. If defensible space were widely adopted, fewer resources from perimeter control would be reassigned to structural defense, allowing quicker containment of the fire.

The unexpressed assumption of this viewpoint is that the values at risk are contained in the structure and that the landscape is expendable. The actual facts are very different. The survey revealed that about one person in five considered protection of the landscape more important than protection of the structures. Those who work with urban-wildland intermix (also known as the "I-zone") residents have been told that if the landscape is lost, people will not want to live in the area anymore. After the 49'er fire, many people whom interviewers looked for within the fire perimeter had sold or moved out since the fire, even if the structures were saved. Other evidence of the importance of the environment is more obvious. For example, people build expensive homes in the I-zone and commute longer distances to work, even when they could live in good suburban neighborhoods closer to their jobs.

Concern for erosion control and water quality (as illustrated by the Middle Creek watershed project) also suggest that the landscape may be more highly valued than the structure. Those who value wildlife and energy management (shade and protection from wind) also suggest this. Homes may be quickly rebuilt, but 100-year-old trees cannot be replaced by insurance.

If fire destruction does result in the departure of many residents, the social structure of the neighborhood will be disrupted. Friends will be separated. Feelings of security and predictability will decline. Uncertainty will increase, and distress and anxiety may follow. The quality of life will be markedly diminished. Recovery from disasters is enhanced if conditions can be returned to near normal as soon as possible (Albrect and Adelman 1987, Drabek 1986, Lindell and Perry 1992). If the setting can be protected or repaired quickly, the familiar pace and flow of neighborhood life

may be easier to restore. If so, the important human, non-property losses associated with wildland-urban intermix fires can be reduced.

Ultimately, of course, if the landscape does not burn intensely enough to kill the larger trees and other important vegetation, it is less likely to destroy structures. If the rate of spread is slow enough to permit residents to escape easily and unhurriedly, it will also be easier to bring adequate suppression forces to the attack. Any vegetation management strategy that protects the landscape values at risk will also protect structural values and human life imbedded in that landscape.

A second important, unspoken assumption in our approach to fire protection for the wildland-urban intermix is that the wildfire will burn out of the wildlands into the settlements to threaten lives and destroy homes. Although that often occurs, these fires usually start in or on the perimeter of an I-zone settlement. The risk of ignition in the wildlands, with the exception of lightning, is concentrated in areas of human activity. Human activity with fire potential is most concentrated in wildland-urban intermix settlements. There one finds the greatest potential for children with matches fires, the greatest opportunity for equipment fires, the greatest likelihood for escaped debris fires, and the chance that structure fires will spread to the wildlands.

I-zone fires that threaten lives and homes are those that probably start in a settled area and grow to dangerous proportions because the settlement and its immediate environments have not been treated to reduce the fuels, alter the fuels to make them less flammable, eliminate the fire ladder, and create fuel and fire breaks to contain the risk.

Viewed from this perspective, the usual recommendations of defensible space with the focus on assisting suppression forces with individual structure protection are less sensible than defensible space designed to contain risk by managing vegetation throughout the settlement and its immediate environment and to prevent fires that will inevitably start within the settlement from spreading rapidly, growing to destructive intensities, and burning into the wildlands and then into other settlements.

This risk containment strategy, fortunately, works both ways. It will also reduce the danger from fires burning out of the wildlands into the settlement.

Finally, this shift in perspective requires that prevention not be equated only with Smokey Bear programs for kids and information and education programs for adults. Prevention is not only posters, state fairs, rodeos, parades, exhibits at the mall, team teaching, or television, radio, and newspaper public service announcements (PSA's), news stories, and features. Of course all of that is an important part of a fire prevention strategy, especially in the wildland-urban intermix. However, the engineering leg of prevention's tripod (engineering - education - enforcement) is just as important. In the I-zone, engineering means, among other things, large-scale vegetation (fuels) management. If prevention seems not to stand on its own today, it is partly because the engineering leg has not been as developed as enforcement,

information, and education. Even the information and education leg, although large, is presently weak in its application of modern communication and marketing theory.

In summary, we need to think more about strategies to prevent wildland-urban intermix fires from quickly spreading and growing to destructive power. We must cool the inevitable fires down, slow them down, and keep them on the ground to give suppression forces time to arrive and control them and to limit losses experienced between ignition and mop-up. Fire intensity and rate of spread are functions of topography, weather, and fuels. Only fuels are significantly within our control. We need to shift our thinking from the suppression perspective. We need to shift the way we think of prevention from ignition reduction to include reduction of the potential for fire damage and threat to life through large-scale fuels management within and surrounding settlements. We need to work with whole neighborhoods and settlements instead of targeting only individual property owners to develop and implement a coordinated set of wildfire defense preparations that integrate suppression, fuel management, and prevention in a cost-effective, holistic approach to fire protection.

Landscape for Wildfire Defense Management

If apathy, lack of knowledge of defensible space, or skepticism about the effectiveness of defensible space is not the problem, what has prevented people from protecting themselves and their property from wildfire? Innovation diffusion theory suggests that the problem might lie with public perceptions of defensible space as an innovation. Research has shown that an innovation will earn acceptance slowly unless it is thought to have a relative advantage over alternatives, and is compatible with values and accepted ways of doing things, relatively simple to understand and use, observably beneficial, trialable on a small scale before full scale commitment is required, and adaptable to individual situations without losing effectiveness (Rogers 1983).

To assess public perception of defensible space, samples of residents of selected wildland-urban intermix neighborhoods between Grass Valley and Paradise, California were surveyed. The results make it clear that, at least for these I-zone residents, people know about defensible space and believe that it is effective. They also believe that it is costly, somewhat complex, and potentially incompatible with landscape values. Other perceived characteristics are not entirely positive. It appears that the characteristics of defensible space itself, as perceived by potential users, create barriers to its widespread adoption.

Barriers to Implementation of Defensible Space

Several concepts must be defined to describe how people perceive technology. Observability is the degree to which people can “see” the technology and its positive effects (Rogers 1983). Trialability is the degree to which the technology can be experimented with on a small scale before the decision has to be made to invest in it (Rogers 1983).

Plasticity is another important characteristic of new technology influencing its potential for adoption: it is the degree to which the technology can be modified to fit individual innovator’s situations without adversely affecting its relative advantage. Rogers (1983) does not discuss “plasticity” per se but does describe the role of “reinvention” in adoption.

Relative Advantage

Relative advantage is the degree to which a new technology is perceived to be better than alternatives. Costs, labor requirements, discomfort, and effectiveness for the intended purpose are all part of relative advantage (Rogers 1983). Four out of five people surveyed believed that defensible space would help save their property in the event of a wildfire. For most people, defensible space is perceived to be effective for its intended purposes. Still, one in five does not think it will help save their property. We do not know whether that is because they do not think it will save their homes or because they think of their property in a larger sense to include the landscape.

Lack of defensible space implementation is not because people are fatalistic. Less than one in ten thought that if a house burns it is a matter of luck.

About half of the respondents to the survey believed that defensible space would cost them more money in the long run than the alternative. Less than one in twenty thought defensible space would cost less. Clearly, defensible space is at a relative disadvantage with respect to costs. This is an important barrier to widespread adoption. Increasing the number of people who implement defensible space in the wildland-urban intermix depends heavily on our ability to bring the perceived initial conversion and long-term maintenance costs down.

Almost two thirds thought the work required to maintain defensible space would be about the same as that required by their current landscape. Nearly 30 percent, however, thought it would be harder, and less than one in ten said it would be easier. Defensible space has no labor-saving advantage to make it attractive to wildland-urban intermix residents.

More than half thought it would be difficult to find the time to make the landscape more fire safe, while a quarter thought it would be easy.

Although no question about the perceived discomfort of creating and maintaining defensible space was asked in the survey, later focus groups in Paradise raised concerns over poison oak, snakes, and Lyme disease. Some residents may

be reluctant to work on the undeveloped parts of their lots for these reasons. Because of this perceived barrier, finding ways to get the initial conversion work done for residents without requiring them to expose themselves to these perceived dangers could make defensible space more attractive.

Although defensible space is believed by four out of five people surveyed to help protect their property from wildfire, many remain skeptical. Perceived costs, labor, time requirements, and perhaps aversion to snakes, poison oak, and Lyme disease leave defensible space without a clear relative advantage. This, in part, accounts for the low level of implementation in the wildland-urban intermix in spite of sustained promotional efforts. To achieve greater adoption, costs, labor requirements, and time demands must be lowered.

Complexity

Complexity is the degree to which people find the new technology difficult to understand and use (Rogers 1983). Two-thirds of those surveyed believed that they would have to change their landscape to make it fire safe. About 17 percent thought they would have to make many changes.

More than half of those surveyed understood the different kinds of landscape features and how they protect property from wildfire. Only about 15 percent did not understand those features. In fact, we have found that people in the neighborhoods where we have worked learn the basic principles of fire behavior easily and can apply them to their landscaping decisions pretty well.

Less than two-thirds said they would need to learn new things about landscaping to make the changes required for defensible space. The good news is that they would enjoy learning more about landscaping for the most part.

Considerably less than one in five did not know which features in a landscape make it more or less fire safe.

About one-third of the respondents said it would be hard to know which plants grow in a fire safe landscape. Nearly another quarter were uncertain. Increasing the adoption of defensible space will require better and more available information on recommended plant materials and landscape designs that provide wildfire defense and will survive a wildfire. Locations that sell the plants seem difficult to find to about one in five, while another fifth are unsure.

More than a quarter thought a defensible space landscape would be more complicated to maintain. Almost two-thirds thought it would be about the same, and less than one in ten thought it would be less complicated. Of those who thought it would be more complicated, few thought it would be much more complicated. Perceived complexity of maintenance is a barrier for a few but is not a major barrier to adoption.

Although survey data were not obtained about brush disposal in neighborhoods in which defensible space has been promoted, difficulties in disposing of the large amounts of brush produced in the initial conversion to a fire safe landscape add significantly to the perceived complexity at the implementation stage. The amount of brush produced is

dangerous to burn, it is costly and difficult to haul, and landfills won't take it anyway. This is a major barrier to widespread adoption.

Overall, people generally do not find it difficult to understand defensible space and how it works to protect their property. The major sources of complexity are the amount of work needed to make property fire safe, lack of certain how-to-do-it information, and especially, the difficulty of disposing of the brush.

Compatibility

Compatibility is the degree to which the new technology is perceived to fit with existing values and ways of doing things (Rogers 1983). A little more than 40 percent believed that natural landscapes are more beautiful than planted landscapes while an almost equal number disagree.

More than one-third believed that few changes should be made in the natural landscape while more than half are willing to make changes.

Modifying what is seen as the natural landscape and replacing it with a planted landscape is not compatible with attitudes of many of the people who responded to the survey. Defensible space and wildfire defenses in general need to be understood as compatible with natural landscape values. Landscaping for wildfire defense will be more attractive if it can be shown to restore and protect wildlife, watershed, esthetics, air quality, and other values.

Recommendations

Public perception of defensible space was least acceptable in terms of its relative advantage and complexity. That is enough, however, to slow adoption of wildfire defense preparations among I-zone residents. Promotion strategies that increase perceived relative advantage and reduce perceived complexity will accelerate the adoption of defensible space among residents of the wildland-urban intermix.

The establishment and maintenance of defensible space should be made less costly in terms of money, labor, time, and discomfort for the wildland-urban intermix landowner. Biomass harvesting may be one way to do this in certain circumstances. Chipping and scattering the material back on the ground may be another. Use of light under burning after initial mechanical or hand treatment may also work. Better information should be provided on costs and more cost-effective vegetation management equipment for the wildland-urban intermix.

In addition, the complexity of defensible space as perceived by land owners should be reduced. Improved methods of brush disposal and maintenance will help. Education about fire behavior and landscaping is needed. Plant materials and landscaping advice should be more readily available.

Perceived incompatibility with values for natural landscapes will be a barrier to some. The best way to handle

compatibility difficulties is to adopt a marketing perspective. In marketing, one does not “sell” the idea by trying to change attitudes and values. Instead, one attempts to modify the product to fit existing attitudes and values (Kotler 1981, Solomon 1989). Neighbors and opinion leaders are important when compatibility is in question (Rogers 1983). Illustrations of typical neighborhood landscape designs that are fire safe and provide for wildlife, watershed, esthetics, and other values identified during marketing research will help.

Defensible space promotion programs should be targeted at neighborhoods and other relatively homogeneous groups. Resident input into planning and implementation should be extensive and their concerns, interests, and suggestions should be incorporated into the wildfire defense plan. Residents should be involved in the development and implementation process as a community to the greatest extent possible. Marketing is most effective when it is targeted to homogeneous market segments; neighborhoods tend to be socio-economically homogeneous and, in the I-zone, share the same wildfire threat.

Rapid implementation of defensible space in neighborhoods will be facilitated by ensuring that the benefits are observable. In the Shingletown Ridge project, we encouraged neighbors to pile brush for chipping at the roadside. The growing numbers of piles and later, the activity of the chipping operation to dispose of the brush communicated clearly to other people in the neighborhood that fire safe work was being done. Participating lots should be marked with an emblem of some kind showing that hazards have been reduced.

Not everyone is willing to implement landscaping for wildfire defense fully without seeing how it will look on their own property first. By making the neighborhood-based hazard reduction project an annual event, skeptics have the opportunity to try it out on a small part of their property. When they find they like it, they will fully implement fire-safe landscaping at the next opportunity.

Defensible space is adaptable to the requirements of each setting and to the tastes and preferences of most people. Its attractiveness will be enhanced if that flexibility is maintained. Attempts to make specific fire-safe rules and apply those rules to every site will result in less adoption and less effective wildfire protection. By educating people about fire behavior and advising them on applications of hazard management to their particular situation, more people are likely to accept defensible space.

Summary

Fire prevention is more than information and education aimed at reducing the numbers of fire starts. That is part of prevention—a very important part—but fire prevention works best when supported by three legs: information and education, enforcement, and engineering, and integrated with suppression and fuels management. In the wildland-urban intermix, engineering involves hazard management. Hazards are those

things that will burn and the characteristics of those things and the topography and weather that cause them to burn intensely.

Fires will start in the wildland-urban intermix. They are most likely to start where human activity is concentrated. Those concentrations are typically settlements. The fire that destroys homes in the wildland-urban intermix probably will start in a settlement and grow to dangerous intensity because available fuels (and weather and topography) allow it to grow rapidly. Suppression forces find they must deal with human safety and structural protection when they arrive and are unable to take direct action on the fire itself. One solution is to contain the risk through a settlement-wide effort at hazard reduction to cool the inevitable fire down, slow it down, and keep it on the ground.

Risk containment requires a community- or neighborhood-based marketing effort. Neighborhoods are good market segments to target with fire prevention education and promotion because the residents are relatively homogeneous in terms of socio-economic characteristics, tastes and preferences for home and environmental characteristics, and they face the same fire threat in the same fuel type. Marketing is not selling. Marketing attempts to discover the sort of “product” the consumer wants and then to produce, price, promote, and deliver the product. With some modification, the marketing approach has been successfully applied to public safety and health campaigns similar to fire prevention.

In the areas studied to date, the slow rate of adoption of wildfire defenses by people living in the wildland-urban intermix is not the result of lack of knowledge, motivation, or skepticism about the effectiveness of defensible space. Instead, a number of barriers have resulted from perceptions of defensible space. Defensible space does not have a clear relative advantage compared to alternatives; it is perceived to be somewhat complex, and has the potential to conflict with important values or established methodologies. Increasing the rate of adoption and use of wildfire defenses in the wildland-urban intermix requires fire prevention officers to be conscious of perceived barriers and work to remove or mitigate those barriers.

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