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The 2013 Colorado Wildfires

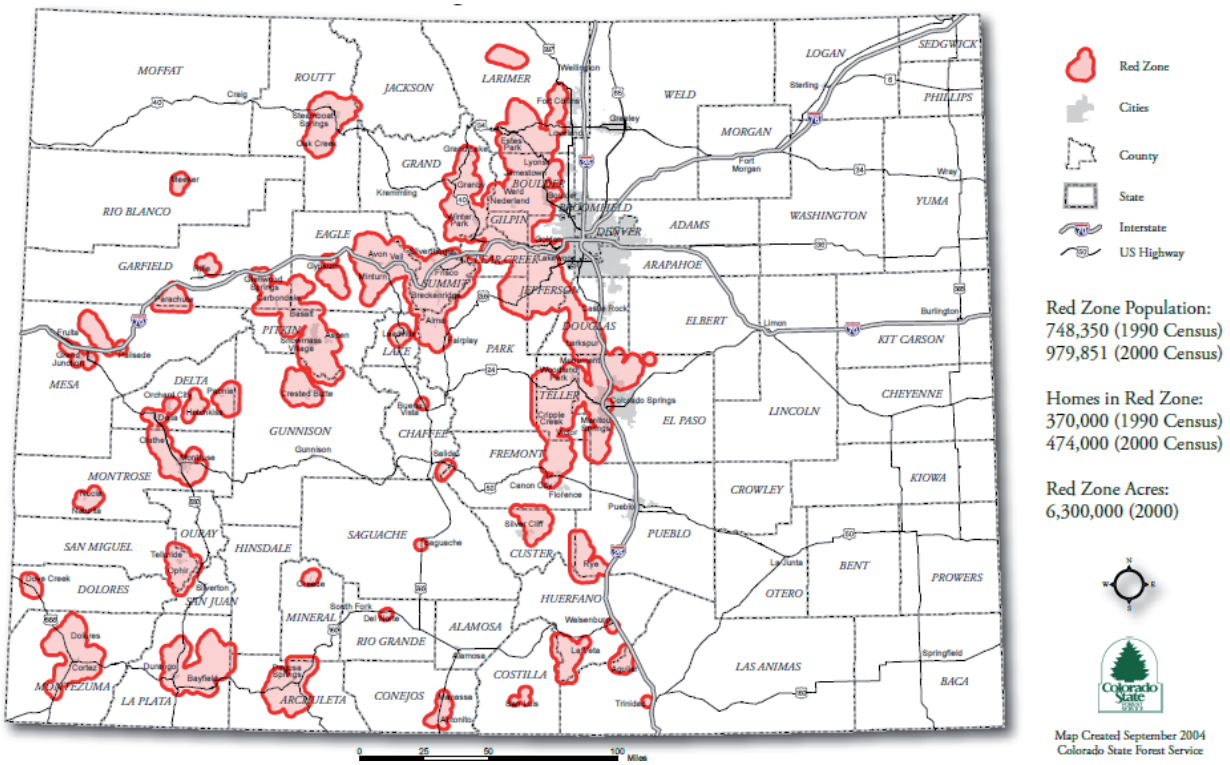
During summer of 2013, Colorado experienced the most destructive wildfires in state history. Colorado annually suffers from wildfires of varying intensity, and those in 2013 were particularly aggressive due to the confluence of environmental conditions including record-high temperatures, drought, and hot, dry winds. Yet, neither the 2013 wildfires, nor previous ones, have resulted in any mass migration away from burn zones. There has been some long-term migration, principally by people whose homes have been destroyed, and some people who live in areas that are repeatedly evacuated have indicated their intention to migrate. More noteworthy, however, are the temporary evacuations during wildfires, which have been successful in removing people from risk areas, limiting loss of life to two people who did not evacuate in time. However, the overall trend is that development in high-risk zones is consistently increasing, creating greater potential necessity for evacuation or displacement as a larger population increases environmental risk affecting more people. Therefore, new policies concerning wildfire mitigation must be responsive to existing risk factors and prevent potential increase in risk factors, both environmental and human, by using lessons learned from previous fire seasons. This case study of the 2013 Colorado wildfires examines the causes and consequences of these fires, with a particular focus on evacuation, displacement, and policies that were successful in limiting their human consequences.

1. THE 2013 WILDFIRES

The 2013 fires were the most intense on record in Colorado state history due to both their number and severity. The Black Forest fire was the most destructive of the numerous wildfires during the 2013 season. Although the fire raged for a relatively short period of time, from June 11 to June 20, it destroyed 14,280 acres and 511 homes in addition to killing two people who did not evacuate in time to escape the blaze. Otherwise, the evacuation effort was successful: the evacuation zone covered 24 square miles, impacting nearly 40,000 people (Schneider 2013). Another notable wildfire during the 2013 series was the West Fork Complex fire, comprised of the West Fork fire, the Papoose fire, and the Windy Pass fire. Collectively these fires consumed over 110,000 acres as they burned from June 5 to July 19 (Schneider 2013). Several other wildfires burned during the June and July fire season, but no centralized data has been compiled on the extent of the damage or number of people evacuated.

The cause of the fires can be either natural (lightning) or man-made, and once ignited the fires were exacerbated by record setting temperatures, compounded

by hot, dry winds that accelerated the spread of the flames. The increasing human consequences of wildfires, including destruction of homes and evacuations, are directly correlated to the increased number of people living in the wildland-urban interface. The Colorado State Forest Service defines wildland-urban interface (WUI) as "any area where man-made improvements are built close to, or within, natural terrain and flammable vegetation, and where high potential for wildland fire exists" (Colorado State Forest Service). The following map of Colorado indicates the state's "red zones", areas of the WUI most at risk for fire:



Source: Colorado State Forest Service, 2004.

Wildfire suppression costs have skyrocketed due to the increased severity and frequency of fires, which can be attributed to four main causes: climate change, accumulation of flammable materials, ignition agents, and ongoing human development in fire prone areas (Flannigan 2005: 847). Previous policies of suppressing the fires, which initially decreased wildfire occurrence, have led to a buildup of fuel, which means that when fires do strike these areas their severity is exacerbated by an over-abundance of flammable material. Because wildfires are part of the natural cycle in wildland areas, it is primarily encroaching human development that puts people at risk, therefore necessitating policy measures that prioritize mitigation of damage in human-developed areas.

Permanent migration away from high-risk areas is a common response to natural disasters, including wildfire. In the first study of migration dynamics following a wildfire disaster, Nawrotzki et al focus on the 2010 Fourmile Canyon fire in Colorado, and their conclusions provide insight that may be applicable to other fire disasters in Colorado and beyond, such as the 2013 wildfires. Based on survey data, Nawrotzki et al identify several key factors influencing peoples' decision to migrate or not after a major wildfire. They assert that existing literature suggests "a clear direction for

the relationship between hazard migration and factors such as gender and place attachment but is ambiguous on the association with age, socioeconomic status, social networks, and risk perception" (Nawrotzki et al 2014: 217). However, their study reveals that risk perception was in fact a significant factor for those impacted by the Fourmile Canyon fire. "Individuals who evaluated their property as fire prone were almost 11 times more likely to intend leaving the WUI area compared to individuals who did not consider their property fire prone" (Nawrotzki et al 2014: 220). People who have already experienced evacuation are more likely to acknowledge their property as fire prone. Given that approximately 40,000 people were evacuated due to the Black Forest fire alone, in addition to those evacuated due to the other 2013 fires, perception of risk may greatly increase among affected populations, which may have an impact on future migration (Schneider 2013).

Although the study by Nawrozki et al only assesses the intention to migrate, and not actual migration patterns, there are potential negative consequences if those residents most aware of risk leave the WUI. Drawing on Dash and Goodwin (2007), the authors hypothesize that "if individuals with higher risk perceptions leave the foothill/ mountain area, a self-selection process may lead to a proportional increase of WUI residents with lower risk perceptions who may be more confident in their abilities to deal with forest fires, and perhaps demonstrate different mitigation and evacuation behaviors" (Nawrotzki et al 2014: 221). This highlights the importance of ensuring that all people who live in the WUI areas are knowledgeable about the actual risks to their property and what they can do to mitigate these risks so that they can make well informed decision about whether or not to migrate.

During the severe 2013 fires, there was extensive property damage but minimal loss of life, which speaks to the success of evacuation policies but the shortcomings of mitigation policies. These policies responses will be discussed in the next section, along with possible avenues for future policy developments.

2. POLICY RESPONSES

The extent of the consequences of these wildfires is largely dependent on policies made and implemented at the national, state, and local level in order to mitigate risk and react to the disaster. Policy responses addressing wildfires include those focused on the environment and those focused on people, as well as those intended to prevent or mitigate wildfires and those intended to respond to them. Ideally all these priorities should be complementary or even integrated.

Across the United States, there have be policy shifts regarding how best to address wildfires. From initial policies of fire suppression, current environmental policies have expanded to include controlled burns and clearing brush and dead vegetation in risk areas. For example, a 2013 Colorado law "Creating a Prescribed Burn Program under the Division of Fire Prevention and Control" implements a program of prescribed burns following minimum prescribed burning standards and to be supervised by a state certified prescribed burn manager.

One of the policy challenges in addressing wildfires is coordinating action at the national, state, or local level. In the United States, a National Fire Plan was undertaken in 2000 following a particularly brutal season of wildfire catastrophes, and the state of Colorado has also developed its own responses that are implemented at the local level. However, yet another challenge is coordinating the multiple agencies that are involved in fire prevention and response, including the forest service, fire service, and emergency management.

2.1. Policy Responses Implemented in 2013

The biggest success of the response to the 2013 wildfires was the evacuation effort,

which prevented loss of life except for the two people killed by the Black Forest fire. Evacuation procedures that have been put in place include pre-evacuation warnings, optional evacuation announcements, and mandatory evacuation orders. In Colorado, the State Emergency Operations Plan has an annex outlining evacuation procedures, which are led by the Division of Homeland Security and Emergency Management with support from 11 supporting agencies.[1] The policy explains that

Evacuation, as an emergency management function, consists of four distinct and mutually supporting phases applicable to all evacuation operations and to all levels of government.

- a. Collection and analysis of data necessary to fully understand the potential impact and threat.
- b. Preparedness activities to ensure government officials and the public understand what actions to take and how and when to accomplish those actions.
- c. Implementation of evacuation operations with the goal of saving life by efficiently moving people, animals, and equipment out of harm's way.
- d. Sheltering and providing mass care for evacuees in facilities, which meet the basic needs of the general and special needs populations. (Colorado State Emergency Operations Plan 2013: 2-3)

Initially, these phases are to take place at the local level and escalate as necessary, depending on the scale of the disaster. Therefore, individual towns and communities have more specific policies concerning how they will make and execute evacuation decisions.

A major factor in ensuring a successful evacuation is to make sure all people in the evacuation area are well informed of both the pre-evacuation status and the optional or mandatory evacuation orders. In 2013, such communication was carried out by phone calls, radio and television announcements, and online announcements on official sites and social media, ensuring that the maximum number of people was informed as quickly as possible.

Risk mitigation behaviors, taken before occurrence of wildfires, are also a key factor in lessening impact in residential areas. According to a study conducted by Brenkert-Smith et al about the risk mitigation behaviors of residents in WUI areas: "wildfire information received from local volunteer fire departments and county wildfire specialists, as well as talking with neighbors about wildfire, were positively associated with higher levels of mitigation" (Brenkert-Smith 2010: 1139). Therefore local efforts, such as minimizing flammable materials on family property, are essential to promote community level behavioral change to adopt mitigation measures.

Being knowledgeable of the level of risk is one factor that encourages people to take mitigation measures, which was done to a limited extent before the 2013 fires. One innovative tool for enabling the public to assess risk before the outbreak of wildfires is the Colorado Wildfire Risk Assessment Portal (CO-WRAP), created in 2013 by the Colorado State Forest Service based on the results of the 2012 Colorado Wildfire Risk Assessment Project. CO-WRAP is an online platform to identify and quantify wildfire risks.[2] Individuals can search for information about their location in order to determine the level of risk in their area as well as what mitigation measures to take.

Another mechanism, established at the national level in 2003 and implemented locally in Colorado, are Community Wildfire Protection Plans (CWPPs). Such plans are part of the national Healthy Forests Restoration Act of 2003. This law prioritizes

1. American Red Cross, Civil Air Patrol, Colorado Veterinary Medical Foundation, Colorado Volunteer Organizations Active in Disasters (COVOAD), Department of Agriculture, Department of Human Services, Departmentof Military and Veterans Affairs, Department of Public Health and Environment, Department of Public Safety, Department of Transportation, Salvation Army.

2. Accessible at: http://www.coloradowildfirerisk.com/

concerns for public safety, community sustainability, and natural resources by aiming to address challenges such as local fireFigure hting capacity and how to prioritize land management. It emphasizes the community level aspects of wildfire preparedness by according financial benefits to communities with wildfire protection plans in place. As defined by this law,

The term ''community wildfire protection plan'' means a plan for an at-risk community that—

(A) is developed within the context of the collaborative agreements and the guidance established by the Wildland Fire Leadership Council and agreed to by the applicable local government, local fire department, and State agency responsible for forest management, in consultation with interested parties and the Federal land management agencies managing land in the vicinity of the at-risk community;

(B) identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment on Federal and non-Federal land that will protect 1 or more at-risk communities and essential infrastructure; and

(C) recommends measures to reduce structural ignitability throughout the at-risk community.

In Colorado, the CWPP is not simply the creation of a plan, but an ongoing process including representatives of local government, the local fire service, representatives of the Colorado State Forest Service, and other relevant local stakeholders. Implementing this process at the local level aims at adapting national and state policies so they can take into account the specific environmental and social context of at-risk communities. Additionally, there are selective tax credits possible for homeowners in WUI areas who engage in wildfire mitigation methods (Extend Wildfire Mitigation Financial Incentive 2013).

Although these policies in place in 2013 were not sufficient to compensate for the severity of the wildfires, they did successfully evacuate the populations at risk. However, had mitigation policies been more effective before the 2013 wildfire season, displacement due to loss of homes could have been minimized. As a result of climate change, there is a heightened risk of severe fires like those in 2013 recurring, which is why it is necessary to adopt policies that will minimize the future impact of wildfires on residential areas so as to reduce displacement and the necessity of temporary evacuations.

2.2. Future Policy Options

It is unlikely that measures will be taken immediately that will mitigate the effects of climate change exacerbating wildfires, policy solutions to address wildfires must respond to the buildup of fuel and development in high-risk zones. Such policies will decrease the destruction of residential areas, subsequently reducing displacement, as well as lessen the necessity for temporary evacuations.

In addition to national-level policies, in Colorado specific policies are made at the state level addressing wildfire mitigation, including evacuation and recovery. Colorado Governor John Hickenlooper established the Wildfire Insurance and Forest Health Task Force to address statewide wildfire policy on 30 January 2013. The goal of this task force was to "identify and reach agreement on ways to encourage activities, practices, and policies that would reduce the risk of loss in wildland-urban interface areas, and provide greater customer choice and knowledge of insurance options" (Wildfire Insurance and Forest Health Task Force 2013). After the devastating consequences of the 2013 fires, it became evident that the work of the Task Force was all the more urgent. The Task Force released its final report in September 2013, but as of early 2014 none of the recommendations had yet been adopted by the Colorado state legislature.

The findings of the Task Force center around three main axes to mitigate wildfire disasters: legal requirements, increased awareness, and incentives. Within

each axis, specific policy and practical recommendations were made to address the practical realities of living with wildfire risk. Each year, wildfire risk grows as human development encroaches in the WUI. According a Colorado State University study cited in the Task Force Report, " the state's growth of development in the WUI will increase from 715,500 acres in 2000 to 2,161,400 acres by 2030, a 300 percent increase" (Task Force 2013). If the problems related to wildfire vulnerability are not addressed now, this encroachment into the WUI will only exacerbate the damage done by wildfires.

One measure proposed by the Task Force is to build on the existing CO-WRAP (Colorado Wildfire Risk Assessment Portal) to enhance disclosure of risk to all relevant stakeholders. It suggests building on the current system with significant data collection in order to make the tool capable of measuring changes in mitigation outcomes on a specific property. To do so, risks will be quantified in order to give each property in the WUI a score representing its vulnerability. Scores will then be disseminated to stakeholders, including prospective homeowners, realtors, home builders, lenders, insurance providers, and local government to ensure they are well informed and able to take the appropriate mitigation measures (Task Force 2013: 2). Properties that score above a certain risk threshold will be audited. "These Audits will serve several goals: (1) they will provide disclosure to relevant stakeholders; (2) they will provide information to homeowners about what steps to take to reduce the CO-WRAP score; and (3) they will provide incentives for homeowners to act to reduce wildfire risks to their properties" (Task Force 2013: 2).

Brenkert-Smith et al (2012) identify changing the behavior of homeowners in fire-prone areas as the most effective way to mitigate wildfire consequences. Indeed, because much of the ignitability of homes and surrounding vegetation can be controlled by homeowners, mitigating this risk factor is one of the simplest and more effective immediate measures that can be taken to immediately reduce wildfire risk. However, to implement such a strategy effectively it is essential to coordinate best management practices so that homeowners do not receive conflicting recommendations, for example those given by the State Forest Service versus those given by local fire departments.

As a legal measure, the Task Force has recommended a special tax on properties located in the WUI, the revenues of which would go to fund wildfire mitigation activities. "This is consistent with the principle that homeowners in the WUI should take on the risks and associated costs of living in wildfire-prone areas." (Task Force 2013: 3). An additional legal measure proposed by the Task Force is to modifying building codes within the WUI to ensure that buildings are designed and constructed with materials that limit flammability, however it recognizes that such a measure would not solve problems related to existing structures in the WUI.

Importantly, current policies maintain that residents themselves in the WUI area are expected to assume responsibility for risk mitigation; therefore support for relocation is limited or nonexistent. Insurance rates are cognizant of the fact that these homes are in high-risk areas. However, if homeowners themselves are to take on the burden of wildfire mitigation, there must still be support from the local government to enable such an approach to be community-based, because even one household does not comply it will increase risks for the entire neighborhood.

Additionally, although current evacuation policies are effective, as development in WUI areas continues evacuation infrastructure and policy must adapt. Some of this is as basic as adapting the necessary infrastructure, but this is often ignored, as Cova et al assert. "In most cases housing units are added to fire-prone canyons and hillsides without improving the road infrastructure. This means that although new roads may be added to a community to support the development of additional homes, an improvement in the number, direction, and capacity of the primary exits is much less common" (Cova 2013: 274). Without the necessary primary exits, traffic

flow during evacuation is slowed, potentially to a point that negates the efficacy of the evacuation. If development continues to be permitted in the WUI, strict policies must be in place to ensure the necessary infrastructure is in place for reducing wildfire risk and enabling evacuation.

Fortunately the displacement due to wildfires in Colorado is still primarily limited to short-term evacuations, but as the risk factors for wildfire intensify so does the risk for more long term displacement due to desire leave risk areas or destruction of homes. Such a situation will necessitate more intense, costly policy responses; therefore it is paramount that additional preventative policies be made now.

3. CONCLUSION

The 2013 Colorado wildfires, while the most destructive on record in terms of structures destroyed and acres consumed, resulted in minimal loss of life and displacement. Despite the number of communities threatened by the fires, and the number of homes that burned down, evacuation measures were successful in ensuring people had departed in time to prevent loss of life. However, those who did lose their homes were displaced and are now facing the difficult decision of whether to migrate away or return and rebuild. To prevent such displacement in the future, policies must not only be responsive to wildfires when they occur, but preventative to reduce the risk of future human and environmental consequences of wildfire. ♦

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