

# Local media coverage of wildfire disasters: An analysis of problems and solutions in policy narratives

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## Abstract

Many communities face increasing vulnerability to the risks posed by natural hazards, such as floods, wildfires, and hurricanes. In the public policy literature, natural disasters can garner the attention of the public and elites and therefore become focusing events that can open windows of opportunity for policy change to reduce community vulnerability to local risks. Past decisions by governments to ignore or leave hazard risks unaddressed can also be viewed as policy failures when the disaster results in loss of life or property. Whether risk from such disasters persists depends on whether governments learn and adapt based on their experiences with disasters. This research examines two catastrophic wildfires that occurred in Colorado, USA, to determine how policy narratives about these events may influence policy change. Media coverage is analyzed as a measure of the policy narratives within communities. Findings indicate that patterns of policy narrative construction in these cases may preclude public dialog focused on mitigating wildfire risk through policy change.

## Keywords

Natural hazards, policy narratives, natural disasters, policy change

## Introduction

Many communities in the United States and globally face increasing vulnerability to the risks posed by natural hazards, such as floods, wildfires, and hurricanes. Vulnerability may be increased by climate change and exacerbated through land-use changes and development

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in risk-prone areas, such as floodplains and forests. These vulnerabilities can worsen the impacts of a natural disaster on human communities when one occurs. Governance institutions are challenged by these vulnerabilities and struggle with how to cope and adapt in the face of increasing risks to communities and people. Natural disasters can garner the attention of the public and elites and therefore become focusing events that can open windows of opportunity for policy change to reduce community vulnerability to local risks (Birkland, 1998, 2006; Kingdon, 2003). Past decisions by governments to ignore or leave hazard risks unaddressed can also be viewed as policy failures when the disaster results in loss of life or property (Birkland, 1997). These issues, then, provide impetus for scholars to explore the relationships between policies, communities, and risks or disasters in order to understand how and when adaptive changes to policies may happen.

While policy scholars often study the collective decisions made in response to disasters, natural hazards scholars attempt to understand how individuals or groups mitigate risks posed by naturally occurring events (White et al., 2001). Risk mitigation, undertaken to reduce peoples' risk or vulnerability to natural hazards, can take place prior to a natural disaster if the risks are known, or in response to a disaster once those risks are clear. Both bodies of scholarship attempt to understand how, why, and under what conditions we learn from disaster events and, subsequently, adapt to risks posed by natural hazards. Decisions to mitigate risk and decrease future vulnerabilities, however, are dependent on many factors, including public debates about the severity of the hazard and decision-maker beliefs or perceptions of risk. This study is situated within these overlapping influences on policy decisions wherein communication and understanding of risks and disasters can influence policy debates and outcomes.

Definition of hazard-related policy problems, acknowledgment of associated risks, and identification of policy solutions to mitigate future risk all either influence or are influenced by the narratives told in the public sphere about natural hazards. Drawing from a long line of scholarship focused on narratives, the Narrative Policy Framework (NPF) (Jones and McBeth, 2010) describes narratives as stories that humans tell which include elements such as settings, characters, plots, and morals of the stories (Jones et al., 2014). These narratives may inform policy actors (e.g. public, decision makers, or advocates), persuade decision makers, or build a broader understanding of policy issues within communities. Further, policy narratives are those narratives constructed specifically about policy issues. These narratives *must* include characters and reference a policy or policy problem, but they may also include such elements as a moral of the story (defined as a policy solution or preference) (Jones et al., 2014).

While the above definition is the foundation upon which this study is built, there is ample room for refining the NPF. For example, while we understand the construction of narratives (including the above-mentioned essential problem referent and character), there is less known about the effectiveness of these narratives to influence policy debates or outcomes. Some scholars have attempted to move NPF studies in the direction of examining effectiveness or influence of narratives in the policy process and this study seeks to build upon such work (see, for example Crow and Berggren, 2014; Shanahan et al., 2011b). Drawing from the policy literature and discussed further below, we argue that in order to influence policy dialogs within the context of natural disasters regarding risk mitigation, policy narratives should also include the following elements: (1) a policy problem that is associated with a natural hazard, (2) some referent to ongoing risk or perceived future risk that communities face from a natural hazard, and (3) an understanding that humans have the capacity to mitigate future or ongoing risk from the hazard. The ways in which these hazard-relevant elements are presented in policy narratives can influence whether individuals, groups, or governments decide to take action to reduce future vulnerability to hazards, particularly through mechanisms such as policies that focus on risk mitigation. Concerning this connection between policy narratives and risk

mitigation policies, this paper addresses the following guiding research question: *do policy narratives of natural hazards and disasters provide the necessary information for communities to change policies in order to reduce vulnerability to future hazards?* Herein we are interested in assessing the potential effectiveness of policy narratives in altering policy debates and decisions. While we do not attempt to connect the policy narratives in this study to policy outcomes, we explore the content of the narratives with the above-articulated elements—both from the NPF and our more specific hazards focus—as our guide.

To answer this guiding research question, this research examines the policy narratives regarding two wildfire disasters in Colorado, USA. For this analysis, local newspaper coverage is used to measure the policy narratives present within disaster-affected communities. The methodological approach used to analyze the policy narratives follows the NPF's coding structure used in previous studies of policy narratives (Heikkila et al., 2014; Jones and McBeth, 2010). These methodological choices and research design are discussed in further detail below. This research helps to advance our understanding of the policy narratives surrounding natural hazards, risk mitigation, and policy change.

### **Policy change in a disaster context**

Both public policy and natural hazards scholars attempt to understand how, why, and under what conditions individuals, groups, and governments learn from natural disaster events or known risks and, subsequently, adapt their policies or plans to mitigate future risks (Birkland, 1997, 2004; Vulturius, 2013; White et al., 2001). Policymakers may attempt to mitigate future risk by implementing policies designed to repair damage from previous disasters, warn of future risks, increase infrastructure resilience or redundancy, or improve broader community planning and design, for example (Albright and Crow, 2015). These policy changes can take place during various parts of the disaster cycle, which includes the following stages: (a) response, (b) recovery, (c) mitigation, and (d) planning (Olshansky and Chang, 2009). In particular, policy changes are likely to take place in the aftermath of a disaster during recovery (after emergency response is concluded), or during the mitigation and planning phases, which are more forward-looking.

A specific hazard that has garnered the attention of many public policy and natural hazards scholars in recent decades is wildfire. Reasons for this increased attention include the fact that wildfires are increasing in frequency and growing in size and severity in the American West (Litschert et al., 2012), and human development is expanding in risk-prone landscapes (Radeloff et al., 2005). Yet, policy-makers and scholars struggle to determine the appropriate courses of action to reduce risk and to understand why some communities (and individuals within communities) do not take action to reduce their vulnerability to wildfire. There are, therefore, significant gaps in understanding policy change at the local level resulting from destructive wildfires. Here, we investigate catastrophic wildfires in two Colorado communities to determine if and how policy narratives, as measured through media coverage, contain the information presumed necessary to influence policy change to reduce vulnerability to future hazards in the aftermath of disasters. We are particularly interested in the following elements of narratives that may influence policy change, which will be further discussed in turn below: (1) whether there is a perceived policy problem associated with a natural hazard and the definition of such a problem, (2) the perceived risk and potential for future risk that communities face from natural hazards, and (3) the perceived ability of humans to mitigate this risk.

For all policy issues, problem recognition and definition is a key element of shaping policy agendas and creating policy change (Kingdon, 2003; Rochefort and Cobb, 1993). Problem definition is influenced, at least in part, by the opinions and beliefs that individuals hold, the

information that they access, and the root causes of the problem as they understand them. In this way, information—including science, narratives, and data about future risks—can play a central role in both forming definitions of problems and delineating the scope of possible mitigation actions. While the NPF has long considered a policy referent essential to the definition of a policy narrative (Jones et al., 2014; McBeth et al., 2014; Shanahan et al., 2011a), in this study we tighten this requirement to be hazards focused and clearly defining a policy problem rather than simply referring to a policy.

Local risk perceptions are also key to understanding both how problems are defined and how risk may be reduced through implementation of policy solutions in the context of natural hazards. However, humans are limited in their ability to accurately understand risk. Perceptions of risk are constructed in part from individual experiences of disaster and understanding the causes of the disaster (Slovic, 1987), along with social processes that surround individuals (Ho et al., 2008; Rogers and Prentice-Dunn, 1997), such as memory sharing through narrative construction. Narratives present within communities may contribute to these social processes and in turn shape both individual and community perceptions of future risks. We therefore include referents to risk and the increasing/decreasing nature of risk as a component of this study.

These risk perceptions and problem definitions may then influence the policy decisions made within communities aimed at reducing the risk associated with existing and future hazards. Policy scholarship indicates that the presence of a clear solution to a policy problem (i.e. a way in which to reduce risk), or a policy framed as a solution by policy advocates, is important to influencing policy change (Kingdon, 2003). In cases where a policy solution is not present, or when policymakers perceive that there is no human solution to a problem, policy change is less likely to occur. This focus on solutions in narratives suggests that without a potential solution—or an understanding that humans can, indeed, help reduce problems—policy decisions to help solve or reduce problems are unlikely. In this study, we therefore include an analysis of narrative components that suggest the ability of humans to mitigate risk from natural hazards that they face.

### *Wildfire as a focusing event and the role of stakeholders*

A natural disaster that has significant impacts on human interests, including life and property, and consequently garners public and elite attention, is considered a potential focusing event. Birkland (1998) characterizes focusing events as those that are

sudden; relatively uncommon; can be reasonably defined as harmful or revealing the possibility of potentially greater future harms; [have] harms that are concentrated in a particular geographic area or community of interest; and that [are] known to policy makers and the public simultaneously. (54)

A wildfire that threatens life and property in the wildland–urban interface (WUI), or areas “where humans and their development meet or intermix with wildland fuel” (U.S. Department of the Interior and U.S. Department of Agriculture, 2001), therefore, can be thought of as a potential focusing event. Focusing events can cause

interest groups, government leaders, policy entrepreneurs, the news media, or members of the public to identify new problems, or to pay greater attention to existing but dormant problems, *potentially* leading to a search for solutions in the wake of apparent policy failure. (Birkland, 1998: 55 (emphasis added))

Therefore, when a disaster occurs, any policies that may play a role in exacerbating the disaster (or future related hazards) may receive increased scrutiny if the event serves to focus

the attention of policymakers and the public. Consequently, the urgency of addressing the policy problems at hand, such as through increased regulation or prohibition of building in fire-prone areas, or through increased attention to emergency response funding and performance, will potentially grow in importance on the policy agenda (Kingdon, 2003).

The ways in which disasters and related hazards are communicated in policy narratives may influence the likelihood of policy change. The results of a devastating event, such as a wildfire, may inspire “pro-change groups [to] mobilize in a number of ways. . .based on the need to react to the event and the failed policies that allowed it to happen” (Birkland, 1998: 57). Such groups may work to define the policy problem in a particular way and advocate for specific solutions to reduce future vulnerability to hazards. In response to these policy problem definitions, policy change may take place in one of two ways: (1) actors may change their opinions and beliefs through policy learning, or (2) groups may work strategically to influence changes in policies (Sabatier and Weible, 2007). Important to hazards and disaster policies, these pro-change groups are unlikely to emerge immediately after a disaster, but rather later in the disaster recovery process (Birkland, 1998, 2006). This delayed emergence of change-oriented policy actors is relevant to our research methods and media sampling timeframe, as described below.

### **The influence of narratives on policy change in the media**

The NPF lays out a conceptual and methodological map by which scholars can study narratives as mechanisms of disseminating essential information as well as persuasive messages related to policy problems in communities. These narratives can lead to learning—and possibly to changes in beliefs—among policy actors or coalitions of strategic-minded individuals (Jones and McBeth, 2010; McBeth et al., 2007), which can lead to policy change (Sabatier and Jenkins-Smith, 1999; Sabatier and Weible, 2007). Narratives are the storytelling structure through which humans communicate and connect, and they form compelling tales that can persuade people to shift opinions and potentially influence political and policy outcomes (Jones and McBeth, 2010; Jones et al., 2014).

Policy narratives can be disseminated directly by policy actors—the focus of most NPF analyses—or can be constructed and disseminated by media actors. However, as Birkland (2006) argues, coalitions advocating for policy change do not typically form in the immediate aftermath of a disaster. How, then, might scholars study policy narratives surrounding disaster events if there are no competing coalitions of actors immediately present to construct and disseminate such narratives? In this study, we use media coverage over 18 months (prior to, during, and after two wildfire events) to capture the narratives surrounding hazards and related risk within communities, as well as the emergence of new policy narratives focused on problems that may be highlighted in the wake of disaster. Through this sampling approach, we are able to see narrative emergence and structure over time related to wildfire risk and disasters, but the dataset will inherently consist of policy narratives and nonpolicy narratives. Because media may construct narratives differently than policy advocates, the NPF definition of policy narratives should be examined here to understand if and how this fits in the wildfire disaster context.

The role that media play in shaping policy agendas (Scheufele, 2000; Scheufele and Tewksbury, 2007) is central to our understanding of how issues are raised to the attention of policymakers in order for policy change to take place (Baumgartner and Jones, 2009; Kingdon, 2003). News media influence the policy agenda by constructing (or co-constructing with policy advocates) the images used to communicate about and understand policy issues

(Baumgartner and Jones, 2009); framing issues in certain ways (Boykoff, 2011; Scheufele, 2000; Scheufele and Tewksbury, 2007); and disseminating the narratives communities use to discuss problems, policies, and solutions (Jones et al., 2014). While narratives created by the media have been shown as important in shaping public opinion and policy agendas (Baumgartner and Jones, 2009; McBeth et al., 2005; Stone, 2011; Zaller, 1992), news media in the hazard context may also provide a critical pathway to discuss possible policy solutions to ongoing risk. NPF research has examined the role of media in the production of policy narratives to determine whether media serve as conduits for policy actor narratives (a more passive depiction of media), or as a contributors to policy debates (a more active depiction) and demonstrated that media can serve both roles—a conduit in some cases and a contributor in others (Shanahan et al., 2008). Moreover, groups may leverage the media to advocate for policy outcomes in the public sphere by using media as a strategic political resource (Sabatier and Weible, 2007). Media articles as sources of policy narratives may be useful for disaster contexts due to the absence or delayed emergence of change-oriented policy actors who may construct their own narratives to sway policy debates (the more typical data used for NPF research).

Media coverage following a natural disaster may often not fulfill its potential as a tool for facilitating policy change as described above, however. Iyengar (1990) describes how the media may frame an issue, in this case a disaster, in two ways: episodically and thematically. When an issue is framed as a single episode, divorced from its broader societal or institutional context, audiences are more likely to view the incident as an individual case. On the other hand, when audiences are presented with contextual, thematic information about an issue, they may attribute broader blame or causality for the problems evident in the story. This broader thematic framing is not the norm in disaster coverage, however. A recent study assessed how media framed 11 of the most significant natural disasters in the U.S. between 2000 and 2010 in major media sources and found that “mass media coverage of major American disasters is sustained for shorter a period of time than other news issues” (Houston et al., 2012: 612). Furthermore, coverage was also limited for issues related to longer term policy change. Instead, stories primarily covered the direct impacts of a disaster as they occurred. In the case of a natural disaster, media coverage peaks during and immediately after the event, as would be expected (Houston et al., 2012). However, it is not clear whether there is adequate inclusion of the context within which disasters occur, or any analysis of the known factors that may decrease future risk from similar hazards (i.e. policies that encourage mitigation of risk or prevent further human expansion in fire-prone areas). In this study, we have attempted to understand this episodic and thematic framing through coding for the topical focus of the narratives we analyze, including those topics that contextualize the wildfire risk and disaster issues to a greater degree (see below for more discussion on this). Thus, the role of media in constructing the policy narratives, through which communities learn about disasters, related hazards, and associated risks is an important area of inquiry for understanding how and under what conditions policies may change in the aftermath of disasters such as a wildfire.

## **Research question**

We know from the literature that attention to policy problems, along with the nature of problem definitions, is a key element of policy change. It is also clear that risk perceptions, particularly about future or increasing risk, are a key to providing support for policies that attempt to mitigate such risks. Finally, if communities think they are without agency to mitigate risk, they may not attempt to do so through policy change or other means.

We argue that, in addition to the baseline NPF elements of policy referents and characters, these narrative elements of risk and mitigation information are important for inclusion in a disaster-related policy narrative because they help construct the thematic framing that Iyengar (1990) argued is essential to tie a single incident, such as a disaster, to broader societal trends, problems, or causes. This connection is vital for a disaster to become a focusing event that can lead to policy changes. In order to assess whether the narratives surrounding wildfire disasters contain the necessary information to turn a disaster into a focusing event, and potentially influence policy change in hazard-affected communities, we ask the following research question and subquestions: *do policy narratives of natural hazards and disasters provide the necessary information for communities to change policies in order to reduce vulnerability to future hazards?*

*RQ1: Do policy narratives acknowledge a policy problem related to a natural hazard or disaster?*

*RQ2: Do policy narratives indicate increasing risk from natural hazards in the future?*

*RQ3: Do policy narratives indicate that risks associated with future hazards can be mitigated through policy or other human actions?*

## Research design and methods

This study analyzed policy narratives in local news media about two of Colorado's most catastrophic wildfires, both of which began in June 2012 in the foothills outside of major municipalities along the Front Range<sup>1</sup>: (1) the High Park Fire near the city of Fort Collins and (2) the Waldo Canyon Fire, which burned into the city limits of Colorado Springs. The High Park Fire killed one person, burned 87,284 acres, destroyed 259 homes, and generated insurance claims for an estimated \$113.7 million.<sup>2</sup> Weeks later, the Waldo Canyon fire killed two people, burned 18,247 acres, destroyed 347 homes, and generated insurance claims of more than \$450 million.<sup>3</sup> Each of these fires was considered the most destructive fire in Colorado's history at the time when it burned.<sup>4</sup> Examining two major wildfires within the same state during the same time period makes it possible to hold the state-level wildfire policy regime and other external media-focusing events relatively constant and explore both local (Colorado Springs and Fort Collins) and statewide narratives present in media. Moreover, if opportunities for policy change in the aftermath of wildfire disasters are present in media coverage, they would likely appear in relationship to an especially destructive wildfire year, such as that experienced in Colorado in 2012.

Newspaper articles were collected from the local newspapers in Colorado Springs (*The Gazette*) and Fort Collins (*The Coloradoan*), and from the largest newspaper covering Colorado and the Intermountain West (*The Denver Post*). The sampling timeframe was constructed to capture news coverage before, during, and after the June 2012 fires to account for the emergence of policy narratives of the disasters and the evolution of those narratives over time. This is especially important in a disaster context because policy advocates are not typically active immediately after a disaster to create and disseminate policy narratives (Birkland, 2006). Rather, in disaster-related narratives, news media are the primary source from which policy narratives can be gathered in the initial period after the disaster event. Articles were selected from 1 January 2012 (about six months before the fires began), through one-year post-fire (in Fort Collins this was 8 June 2013 and in Colorado Springs it was 22 June 2013) from the three Colorado newspapers. The search terms, newspapers, and article counts are included in Table 1. A total of 1847 stories fitting the search terms were downloaded using ProQuest (*Denver Post* and *The Gazette*) and directly from online newspaper archives through a local library (*The Coloradoan*).

**Table 1.** Search terms, newspapers, and article counts.

Newspaper	Audience	Circulation	Search Terms	Article Counts			Total <sup>9</sup>
				Nonfire season	Borderline fire season	Fire season	
Colorado Springs Gazette	Local	64,394 daily	Prefire: risk mitigation, fire prevention, fire management, fire risk Postfire: Waldo Canyon, Waldo Wildfire, Colorado Springs Wildfire	43	39	249	331
Fort Collins Coloradoan	Local	28,501 daily	Prefire: risk mitigation, fire prevention, fire management, fire risk Postfire: High Park Fire, Fort Collins Wildfire	48	44	201	293
Denver Post	Statewide and Regional	416,676 daily	Inclusive of all terms used above	34	24	194	252
		509,571 daily	<b>Total</b>	<b>125</b>	<b>107</b>	<b>644</b>	<b>876</b>



We believe by going directly to full archives, wherever they are housed, that we have compiled the most complete dataset of news articles from these newspapers possible; however, online newspaper research relies upon newspapers to provide their content in a systematic and rigorous manner. We cannot know if there is a systematic bias in our dataset, but we have worked to avoid such a problem that may arise due to our own sampling and collection procedures. Articles that did not focus primarily on wildfire and those that were not written in a narrative format (i.e. lists, bulletins, etc.) were removed from the dataset. A total of 876 articles were analyzed for this study, accounting for both state and local coverage and a daily circulation of over 500,000 readers.

When examining policy narratives in media, researchers are constrained by the availability of data sources other than newspapers. Because of the lack of reliably archived nonnews digital media (websites, blogs, etc.) and because of the expense associated with gathering television and radio archived content, this study uses newspaper coverage as a measure of the policy narratives around wildfires within Colorado Springs, Fort Collins, and the statewide audience for the *Denver Post*. While this is an imperfect measure to be sure, research on intermedia agenda setting suggests that newspapers are an acceptable measure for media coverage due to the tendency for television to “follow” newspaper coverage within the same market (McCombs, 2004, 2005).

Six researchers coded the news articles using a codebook adapted from Heikkila et al.’s work (2014). The codebook measured the article’s topical focus, major themes of risk, use of science and other evidence, presence/definition of policy problems, and presence/type of characters<sup>5</sup> (see Appendix 1 for codebook). Coders followed a standard set of instructions to foster intra- and intercoder consistency and reliability (Krippendorf, 2004). The coding team established intercoder reliability using a random subset of articles (10.3% of total articles) wherein agreement ranged from 59% ( $\alpha = .44^6$ ) for the use of science or data, to 75% ( $\alpha = .63$ ) for themes of risk, to 100% ( $\alpha = 1.0$ ) for variables measuring the presence of risk information and mitigation information, presence of a policy problem, and topical focus. These intercoder measures were achieved after three iterations of (1) coding, followed by (2) discussion by the research team and codebook revisions, and (3) recoding of a new set of news articles.<sup>7</sup> The coded data were then analyzed using SPSS statistical software as appropriate. Qualitative data, particularly those related to our measure of the “problem definition” variable, were analyzed by hand and focused on timing and topic of problem definitions.

## Research findings

As described above, to understand whether *policy narratives of natural hazards and disasters provide the necessary information for communities to change policies in order to reduce vulnerability to future hazards*, we articulated three specific research questions to guide this analysis. Each will be addressed in turn below.

*RQ1: Do policy narratives acknowledge a policy problem related to a natural hazard or disaster?*

To understand whether policy narratives acknowledge a policy problem related to natural disaster damage or risk from related hazards, we assess the topical focus of the media coverage (1 = planning for future wildfire hazards (12.79%), 2 = wildfire response (47.6%), 3 = wildfire recovery (30.71%), or 4 = general wildfire trends (5.14%)), followed by an analysis of the presence of a policy problem (1 = presence, 0 = absence). The interaction between these two variables over time can help us understand when, and coupled with

what foci, policy problems are presented in the policy narratives constructed by news media. We first describe the topical focus of the coverage (Figure 1), followed by an analysis of this interaction using correlation results below.

Figure 1 shows that over the 18-month period of wildfire media analysis we conducted, focus on wildfire response peaked in June of 2012 and again in June of 2013. In both of these months, catastrophic wildfires were burning in Colorado, so this finding is to be expected.<sup>8</sup> Articles focusing on wildfire recovery lagged response coverage, which is also expected based on the disaster cycle described above (Olshansky and Chang, 2009). Articles focused on either preparing for wildfires or describing statewide and national trends ebbed and flowed throughout the year, with a small peak that coincided with the June 2012 fires.

We next analyze patterns of media coverage before, during, and after the peak fire season to understand differences over the 18-month period of analysis. The primary fire season in Colorado is considered to be June through September, when the hottest and driest weather is present. We define “borderline” fire season to be March through May, the months leading up to fire season. The rest of the year is deemed “nonfire season.” Correlation results of the relationship between fire seasonality (1 = nonfire season, 2 = borderline fire season, 3 = fire season), topical focus of coverage (.214,  $p < .01$ ), and the presence of a defined policy problem ( $-.110$ ,  $p < .01$ ) indicate that policy narratives are more likely to focus on response and recovery during the fire season (1 = planning for future fires, 2 = response to a specific fire, 3 = recovery from a fire) but are less likely to include a defined policy problem.

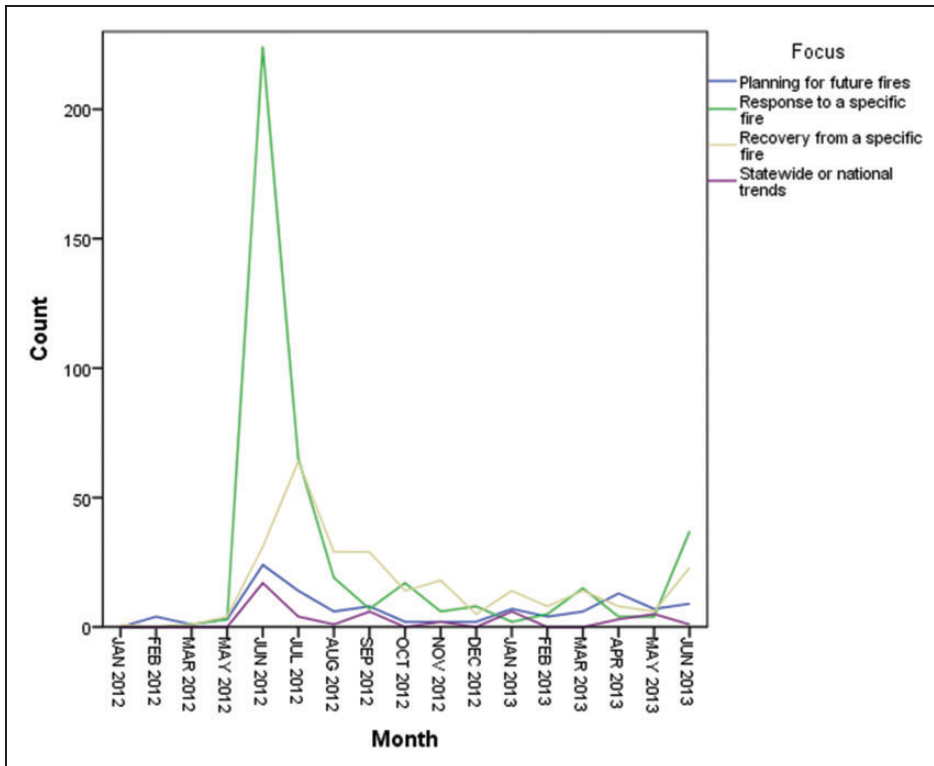


Figure 1. Topical focus of coverage over time.

As outlined above, a required element of a policy narrative is a referent to a policy (Jones et al., 2014). Due to the broader dataset we gathered, which attempted to capture the emergence of policy narratives and therefore also included articles that do not meet the criteria for policy narratives, we analyzed whether articles contained a specifically defined policy problem (which is more focused and clearly articulated than a policy referent as suggested above). Just under half of the articles analyzed define a policy problem ( $n = 386$ , 44%). As discussed above, articles published during fire season are less likely to define a policy problem, and the majority of the articles in our sample were published during fire season.

It is also important, however, that the nature of the policy problems coded in these articles varied widely, particularly as they relate to the fire seasonality presented above. The identified policy problems across all articles ranged from short-term problems in responding to wildfires, to problems in recovery from wildfires, to long-term problems that included increased wildfire risk across the state of Colorado. The most common policy problems centered on government agencies' lack of adequate resources to fight wildfires, with approximately 20% of the identified policy problems falling within this category. Another common problem identified in about 14% of the articles related to homeowners' insurance and issues of: homeowners did not understand their coverage, had problems with the claims process, or discovered that their claims were inadequate to rebuild their homes. Just over 11% of the policy problems addressed increasing wildfire risk, mainly due to additional development in the WUI and climate change impacts. This final category—increasing wildfire risk due to development in the WUI—is the problem definition that would presumably need to be prominent in policy narratives for communities to make significant changes to policies allowing construction in the WUI, encouraging risk mitigation on private property, or mandating other requirements that may lead to reduced wildfire vulnerability in local communities. This is the only problem definition that connected the specific disaster episode with the broader thematic context of risk and policy debates (per Iyengar, 1990). Not surprisingly, the presence of these differing categories of policy problems was not constant throughout the year and often depended on the season and whether a wildfire was actively burning. Table 2 provides examples of the types of policy problems seen throughout the fire and nonfire seasons during the 18-month sample examined here.

Some of the common policy problems in nonfire season (October through February) focused on issues related to insurance coverage, unhealthy forests and watersheds resulting from previous wildfires, and difficulties in the long-term recovery process. It makes sense that these policy problems are covered in more depth during the winter months as they focus on long-term systemic problems as opposed to acute problems that occur during or shortly following a wildfire.

During the borderline fire season (March through May), more problem definitions were focused on issues of preparedness for wildfires. For example, common policy problems during these months included a deficit in the number of planes and air tankers available to fight future wildfires, inadequate risk mitigation by residents in the WUI, and problems with homeowners' insurance. Again, this result is not surprising since officials and residents begin to prepare for the upcoming wildfire season in the spring.

As discussed above, articles published during the fire season (June through September) were less likely to include specific policy problems, but those that did were predominantly focused around problems with fighting or responding to a specific wildfire. For example, many of the problems identified had to do with inadequate resources available for firefighters, such as equipment or funding. In particular, several of the articles specifically

**Table 2.** Examples of policy problem definitions across seasons.

Season	Policy problem	Topical focus	Example quotation	Who is defining the problem <sup>10</sup>
Nonfire season (October–February) <i>Denver Post</i> , 11 November 2012	Homeowners in the WUI are underinsured	Planning for future wildfires	“... their insurance settlements aren't making them whole and have proven much more difficult to obtain...”	State legislators; homeowners; homeowners' attorneys
<i>Fort Collins Coloradoan</i> , 3 January 2013	Increased risk of wildfire due to growth in the WUI and climate change	Statewide or national trends	“... not until 2012 did the warming trend bring with it historic temperature extremes”	Scientists
Borderline-fire season (March–May) <i>Fort Collins Coloradoan</i> , 13 April 2012	Air tankers to fight wildfires are inadequate	Planning for future wildfires	“... air tankers, which are used to fight wildfires, are too old and unsafe”	Colorado Senator Udall
<i>Colorado Springs Gazette</i> , 12 April 2013	Not enough mitigation around homes	Planning for future wildfires	“Homeowners have to step up to the plate and understand that they have a piece of the responsibility...”	Municipal officials; wildfire experts
Fire season (June–September) <i>Colorado Springs Gazette</i> , 10 June 2012	Fire agencies do not have enough resources, such as personnel	Response to a specific wildfire	“The fear is that another major blaze would tap desperately needed resources”	United States Forest Service
<i>Fort Collins Coloradoan</i> , 29 August 2012	Insurance policies are insufficient for rebuilding	Recovery from a specific wildfire	“Holes in the safety net of homeowners' insurance colored the stories that wildfire victims shared with lawmakers...”	Homeowners

WUI: wildland–urban interface.

**Table 3.** Defined policy problems and related narrative elements.

Defined policy problem	Evidence or data	No evidence or data	Total
Presence	49.4% (195)	40.5% (189)	44.5% (384)
Absence	50.6% (200)	59.5% (278)	55.5% (478)
Total	100% (395)	100% (467)	100% (862)
$\chi^2(df = 1) = 11.99, p < .002$ ; Cramér's $V = .117$			
Defined policy problem	Presence of local risk information	Absence of local risk information	Total
Presence	49.4% (132)	41.7% (254)	44.1% (386)
Absence	50.6% (135)	58.3% (355)	55.9% (490)
Total	100% (267)	100% (609)	100% (876)
$\chi^2(df = 1) = 4.50, p < .038$ ; Cramér's $V = .072$			
Defined policy problem	Presence of risk mitigation information	Absence of risk mitigation information	Total
Presence	66.7% (72)	40.9% (314)	44.1% (386)
Absence	33.3% (36)	59.1% (454)	55.9% (490)
Total	100% (108)	100% (768)	100% (876)
$\chi^2(df = 1) = 25.53, p < .000$ ; Cramér's $V = .171$			

discussed Colorado's appeals to the federal government for more funding to support firefighting efforts. Many of the policy problems discussed at the end of fire season (i.e. once the two major fires of 2012 were contained) focused on the risk of living in the WUI as well as the increase in wildfire risk in recent years due to factors like climate change and new development. Despite some of these more systemic, long-term policy problems identified toward the end of the fire season, the policy problems identified during the entire fire season were more generally focused on acute issues related to wildfire response.

Table 3 reports chi-square results for the presence of a problem definition in the articles. The analysis is broken down by: the presence of scientific evidence or wildfire data to support a problem definition, the presence of information about local wildfire risk, and the presence of information about risk mitigation. The use of evidence or data and the presence of risk mitigation information in narratives that did and did not define policy problems are both statistically significant in this analysis ( $p < 0.001$ ). A significant relationship was found between presence of information about risk and presence of a problem definition ( $p < 0.05$ ). As such, articles presenting a problem definition also use evidence to support the argument they make about the problem and present information about local wildfire risk and mitigation of this risk. It is important to note that the coding of science/data is the variable that saw a lower intercoder reliability score as discussed above.

Above we argue that information about risk and future risk is important to include in a narrative in order to catalyze policy action. To understand the extent to which policy narratives focus on present risks, increasing risk, or other themes that may indicate an urgency of action (which we expect would motivate policy action to a greater extent) and the ability for humans to mitigate risk (which we expect would help catalyze policy change to a greater extent), we ask:

*RQ2: Do policy narratives indicate increasing risk from natural hazards in the future?*

*RQ3: Do policy narratives indicate that risks associated with future hazards can be mitigated through policy or other human actions?*

While a majority of articles ( $n = 539$ , 61.5%) did not include a theme related to risk from wildfire hazards (RQ2), the articles that did include a theme related to risk most often discussed two major themes: (1) humans' ability to mitigate risk (11.7% of articles), and (2) the increasing nature of wildfire risk (9.7% of articles). The breakdown of the remainder of the articles that did include a risk theme ( $n = 337$ , 38.5%) according to the specific risk theme they discussed is: (1) risk from hazard is constant = 8.7%, (2) risk from hazard is natural = 1.3%, (3) risk from hazard is man-made = 1.9%, (4) humans are helpless in the face of risk = 5.1% (for the correlation analysis, below, we created a variable of increasing risk and human causal link where 1 = risk from hazard is constant, 2 = risk from hazard is increasing, 3 = risk from hazard is increasing and man-made). Beyond which risk themes are present in media coverage, the relationships between these risk themes and several narrative elements considered important for public discussion of wildfire policy problems are important to consider.

Risk themes related to humans' ability to reduce risk (RQ3) are positively but not significantly correlated with the presence of a problem definition (.121, *ns*) and the use of evidence or data in the article (.005, *ns*). The positive correlation coefficients suggest that when narratives include the elements that we argue (above) are important for individuals and communities to learn from and change in response to disasters, they may be likely to include multiple elements (problem definition, risk information, human agency to mitigate risk). Finally, the presence of problem definitions is positively significantly correlated with the presentation of information on local risk (.072,  $p < .05$ ), indicating that when information about wildfire risk in local communities is presented, it is more often attached to a policy problem.

It is important to note that a minority of articles ( $n = 264$ , 30%) include information on *local* wildfire risk (as opposed to more generalized risk information), while an even smaller number ( $n = 107$ , 12%) provide any information about the specific actions that humans, organizations, or communities can take to reduce risk before a fire occurs (e.g. mitigation information). While we see some positive correlations between the presence of risk themes related to human capacity to mitigate risk and discussion of risk mitigation, both types of information were only present in a minority of articles analyzed.

## Discussion and conclusion

Scholars of public policy and natural hazards alike are interested in understanding how, why, and under what conditions individuals, groups, and governments learn from natural disasters and adapt their behaviors or policies to reduce vulnerability to future hazards. Natural disasters are considered potential focusing events that can draw public and policymaker attention to a particular issue. The public discussions that occur before, during, and after a disaster may serve to narrate the disaster in a particular way, which in

turn may lead to policy changes that lessen risk and vulnerability. These are all vital considerations for scholars and practitioners interested in improving hazards and disaster-related governance in communities globally. In this study, we examined the media coverage surrounding two major catastrophic wildfires in Colorado in 2012 in order to examine how policy narratives concerning the disasters and future hazards may contribute to such policy change. We asked the following overarching research question: *do policy narratives of natural hazards and disasters provide the necessary information for communities to change policies in order to reduce vulnerability to future hazards?* In order to answer this question, the three subquestions analyzed in this study will be discussed here. First, it is important to note that out of this large dataset ( $n=876$ ) of news articles published within communities before, during, and after two wildfire disasters, only 36% qualify as policy narratives under the formal definition used in the NPF. This is a relevant note for NPF scholars in that the commonly used selection criteria may be leaving out a considerable number of narratives that include policy-relevant content, or our coding procedures may be too strict on the problem definition/referent code to fully capture all policy narratives. This is especially relevant for scholars who wish to include, or necessarily must include, media coverage in the narrative dataset such as in hazards research.

In this analysis, we investigated whether a policy problem related to a natural hazard event was acknowledged in the articles sampled (RQ1). While a variety of important policy problems were discussed in the articles, such as underinsured residents and the lack of appropriate risk mitigation on private property, the majority of articles (56%) simply did not define a policy problem. The articles that did define a policy problem (44%) were more likely to occur outside of the fire season when the public may not have been focused on issues related to wildfire risk due to the time of year and lack of focusing events to capture attention. Importantly, the majority of articles analyzed in this study (78.31%) focused on response and recovery from wildfires, and articles with these foci were less likely to include a defined policy problem. Therefore, based on this analysis, the policy narratives constructed by the three newspapers included in this study do not connect the causes or effects of the two catastrophic wildfires with policy problems.

Next, we analyzed the presence of information about wildfire risk in news articles (RQ2). The majority of articles analyzed here did not present any themes related to risk (61.5%). However, those that did include a theme related to risk most often focused on two specific framings: (1) the increasing nature of wildfire risk, which we would expect to motivate policy action to a greater extent; and (2) the idea that humans can mitigate risk, which we would assume would help catalyze policy change to a greater extent. Due to the inclusion of these risk-related aspects in a minority of articles, we expect that the articles analyzed here may not contain enough risk-related information to catalyze policy change. However, because this information is available more frequently during nonfire season, when there are not as many competing wildfire stories, it is still possible that some of this information may be influential in local policy considerations.

Finally, we sought to understand the extent to which themes about human ability to mitigate risk were contained in the articles (RQ3). When articles present a theme related to wildfire risk, they most often communicate that risk is increasing and can be mitigated by humans. However, only 11.77% of the total articles presented a theme suggesting that humans can mitigate risk. When it came to providing actual information on local risk and risk mitigation, news articles failed to consistently include this information as well. Local wildfire risk information was only discussed in 30% of articles, and only 12% of articles provided specific information on actions humans could take to mitigate that risk. Therefore, based on this analysis, it is apparent that the news articles do not consistently indicate that

risk can be mitigated through policy or other human actions (i.e. mitigation on private property).

Importantly, when an article clearly defined a policy problem (44% of articles analyzed), it was more likely to provide information on local risk and ways to mitigate that risk (Table 3). Thus, articles that do acknowledge a specific policy problem related to the hazard may be particularly useful for informing residents about their risk and what they can do to mitigate that risk. However, since a majority of articles failed to define a specific policy problem, and since the articles that did define a policy problem often occurred outside of the fire season when the public may be less receptive to considering the risks and effects of wildfire, it is unlikely that the public is able to glean that they can mitigate their own risk (and what specific actions need to be taken) from the articles analyzed here. Further, it is not likely that the public would understand that their government has the capacity and power to mitigate risk through policy changes.

Thus, while we did find that media coverage is related to wildfire occurrence in predictable ways—response coverage spiked when wildfires were burning and coverage of wildfire recovery lagged this initial spike—the media articles analyzed here do not appear to contain policy narratives from which we would expect policy change to occur in the wake of a wildfire. In other words, while the media certainly seemed to respond to wildfire as a focusing event by increasing coverage during periods when wildfires were burning, the narratives analyzed here are unlikely to drive policy change or influence the public demand for policy change. In order to truly act as a policy change-catalyzing focusing event, the narratives would need to contain the thematic framing that is essential to connect individual incidents to broader problems or causes (Iyengar, 1990). Most articles analyzed here do not acknowledge a policy problem related to wildfire, do not indicate that wildfire risk is increasing, and lack information on risk mitigation that humans can undertake (including policy solutions). As a result, the public may fail to make the connection between wildfire occurrence and existing policy, and may not fully understand that a variety of actions can be taken to reduce wildfire risk on personal, community, state, and federal levels. Moreover, because such a wide variety of problems related to wildfire were presented in the articles—ranging from the need for better wildfire fighting equipment to the fact that many homeowners are underinsured—no single, clear signal or path of action is obvious to the public, which may prevent a cohesive policy agenda from forming in response to wildfires.

While the public is unlikely to become informed about policy problems associated with wildfire hazards or the risk they face living near wildfire prone landscapes from policy narratives such as those analyzed in this study, this does not preclude policy change. Birkland (2006) and May (1990) have both highlighted the importance of what May calls “policies without publics” where policy change happens within a more technocratic sphere, or what Arnold (1990) calls the invisible sphere of policymaking. These less visible arenas are still important, and perhaps more important in certain highly technical policy domains, than the more public sphere of focusing events discussed in this paper. Despite the lack of public debate, it is important to note that policy change in relation to wildfire is still possible and does still occur. Further studies should explore this possibility by linking analyses similar to ours with a broader analysis of the policy process within disaster-affected communities. Additionally, studies such as ours that include narrative elements we argue are important for influencing policy change should be analyzed in combination with policy outcomes data to understand if, indeed, instances where these elements are present in policy narratives see higher levels of policy change to reduce community vulnerability to risks.



While the policy narratives constructed by media are important for the reasons articulated in this paper, the role of the media as storyteller was not fully examined in this study. Because we know that stories can influence policy change even when they lack specific (often scientific) information (Jones et al., 2014; McBeth et al., 2014; McBeth and Shanahan, 2004; Shanahan et al., 2011a), and because so many of the articles included in this dataset do not fit the criteria of a formal policy narrative, it would be useful to analyze the content of the policy narratives (or the broader dataset) presented here for the specific types of stories they tell and how these stories may serve to influence residents' ideas about wildfire as a policy problem. Additionally, surveying the public about their responses to media coverage of specific hazards, and even their interpretations of specific media articles, could provide further information on how the public understands and reacts to the narratives that media constructs about disasters and hazards. Finally, comparing policy narratives of other natural disasters, such as tornadoes or hurricanes, to policy narratives about wildfire could provide additional insight into the narratives that may influence policy change related to natural hazards more broadly.

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### **Notes**

1. Colorado's Front Range, identified as a "major WUI area" (Radeloff et al., 2005), extends along the eastern foothills of the Rocky Mountains and includes the major cities of Pueblo, Colorado Springs, Denver, Boulder, and Fort Collins, plus many smaller communities.
2. Mitchell K and Udell E (23 June 2012) Colorado High Park fire at 82,190 acres: New pre-evacuation orders. *The Denver Post*. Available at: [http://www.denverpost.com/ci\\_20924347/colorado-wildfire-new-pre-evacuation-order-high-park](http://www.denverpost.com/ci_20924347/colorado-wildfire-new-pre-evacuation-order-high-park) Svaldi A (21 June 2013) Colorado insurers update claims from last year's fires. *The Denver Post*. Available at: [http://www.denverpost.com/ci\\_23513279/colorado-insurers-update-claims-from-last-years-wildfires](http://www.denverpost.com/ci_23513279/colorado-insurers-update-claims-from-last-years-wildfires) (accessed 21 June 2013)
3. City of Colorado Springs (2013) Waldo Canyon fire: Final after action report. Available at: [https://www.springsgov.com/units/communications/ColoradoSpringsFinalWaldoAAR\\_3April2013.pdf](https://www.springsgov.com/units/communications/ColoradoSpringsFinalWaldoAAR_3April2013.pdf) (accessed 3 March 2014).
4. A year after the Waldo Canyon fire burned, the Black Forest fire began on 11 June 2013 outside of Colorado Springs, destroying 509 homes and killing two people, becoming the state's more destructive fire on record.
5. The coding for characters is not explored in this article due to our more narrow focus on problems and risk information presented to local communities. For discussion and analysis of the characters, please see (Crow et al., 2016). Of the total dataset in Table 1, 36% (n = 319) are considered complete policy narratives, in that they include a policy problem definition and at least one character; 83% (n = 723) included at least one character, while 44% (n = 386) included a problem definition. The lower number of complete policy narratives may be due, in part, to our stricter coding of defined policy problems rather than only policy referents. Because media are constructing these narratives

rather than policy advocates, and because hazards policy narratives have not been examined to the degree that narratives in other policy domains have been, we believe that it is important to capture the entire policy discussion and we therefore analyze the entire dataset to examine the trends in narrative construction over time.

6. Krippendorff (2004) urges using measures where  $\alpha < .6$  with care and attention to purpose. Because this study is exploratory in nature and previous studies using similar hazards-related coding have not been conducted, we use this science/data measure that falls below .6, but believe that future studies should work to strengthen the reliability of such measures.
7. The variable for the use of science or data, which is used once in Table 3, is the one variable that continues to see a lower intercoder reliability score than is typically acceptable. This variable, as presented in Appendix 1, seems straightforward, but like many of the NPF codes (such as blame and causal mechanisms), there is enough subjectivity in the coding that higher reliability continues to allude researchers. In particular, what constitutes a “cited” source and how to count multiple metrics that appear in a single sentence when it is unclear if they all come from the same or different sources are areas where continued exploration is warranted. Because the code also asks coders to link science/data to the defined policy problem, coders could possibly agree on a policy problem definition but disagree on if/which data were used to support that definition. Unlinking these two variables may help increase reliability of this code.
8. It is surprising, however, that in June 2013, to the right of Figure 1, the Black Forest fire did not garner as much coverage as the fires of 2012. This may, in part, be due to some missed articles due to search terminology, but also perhaps because despite being the most destructive fire on record, the Black Forest fire was not within the urban boundaries of Colorado Springs as was the case in Waldo Canyon in 2012, diminishing the salience and attention to the Black Forest fire.
9. Search dates: 1 January 2012–8 June 2013 (High Park fire = Fort Collins Coloradoan and Denver Post) and 1 January 2012–22 June 2013 (Waldo Canyon Fire = Colorado Springs Gazette and Denver Post).
10. The actor defining the problem was coded based on the “voice” of the article. For example, in an editorial or similar opinion piece, the author of the article was coded as defining the problem when a problem was present. In news articles, an actor was coded as defining a problem if a quotation or paraphrase from an interview was used to define the problem in question.

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## Appendix I: Basic document information

Q1. Does this document primarily focus on wildfire, a specific wildfire response or recovery, or planning for wildfire in Colorado or the West? (IF NO, STOP CODING)

Q1a. Does this document tell a story related to wildfire (bulleted lists or rote information on fire statistics or relief efforts do not count as storytelling, for example)? (IF NO, STOP CODING)

Q2. Date of Document Publication (CHANGE: MODAYYR. FOR EXAMPLE: 032415)

Q3. Publisher (name of newspaper)

Q4. Document Type (check one):

1 News article

2 Editorial, column, or other opinion piece

3 Other (reader comments, etc.)

Q8. Number of words

Q10. Response versus Recovery/Planning Focus (think of primary focus of article).

1. Planning for future wildfires (does not have to be specific tips, but will likely include sense of urgency or call to action)

2. Response to a specific wildfire (including fundraising, relief efforts, etc.)

3. Recovery from a specific wildfire (rebuilding, insurance claims, policy changes)

4. Statewide or national wildfire trends (longer term trends in wildfire risk, recovery, response, etc.)

5. None of the above

Q11. Does the document define an explicit policy problem related to hazards (i.e. we don't have enough regulation or we allow too much development in the WUI)? THE HAZARD ITSELF IS NOT THE PROBLEM

1 Yes

2 No

Q11a. If yes, what is the policy problem defined in the document?

Q11b. Is it clear WHO is defining the problem in this manner? If yes, make a note of the person's name or organization's name.

1 Yes

2 No

Q12. Are risk and failure themes in the article? When considering themes, think about the takeaway message of the reader. Focus on the risk assigned to fire itself rather than ancillary

risks such as erosion, flooding, etc. after fires. If the theme is about those associated risks, mark Other. See below for specific choices. **CHECK ONLY ONE. DO NOT ATTRIBUTE “MAN-MADE” or “NATURAL” UNLESS IT IS EXPLICIT IN THE ARTICLE**

1. Risk from hazard is constant
2. Risk from hazard is increasing
3. Risk from hazard is natural
4. Risk from hazard is man-made
5. Humans are helpless in the face of the hazard/risk
6. Humans can lessen the risk through policy/political action/ personal actions
7. No clear theme (or no theme from the list above)

### Science/evidence

Scientific, Economic, Engineering, or other data are offered as fact or supporting evidence for the dominant argument/cause of hazard risk (with reference); environmental or mechanical studies, measurements, social research, geological surveys, risk data, census data all count as well. Specific references to a study, specific scientists, article, an institution, an expert, consulting firm, an authority can all be considered “a reference.” As long as identifying information is provided, it can be considered evidence, including quotations from scientists in news articles.

Q14. Are data used in this article?

1 Yes Scientific evidence or study is cited or referenced to support the underlying cause of hazard risk, as coded above

0 No Scientific evidence or study is used to critique or refute the cause or risk of hazard, as coded above

Q14a. If so, how was it used? (some kind of a citation should be included when considering these)

1/0 Support their argument Scientific evidence or study is cited or referenced to support the underlying cause of hazard risk, as coded above

1/0 Refute an argument Scientific evidence or study is used to critique or refute the cause or risk of hazard, as coded above

Q14b. Of the above evidence, how many are disaster data (disaster = something that has actually happened rather than predictions including acres burned, homes lost, etc.)? (no citation to science needed)

Disaster Data for a specific fire Data from economic sources, insurance estimates, and emergency officials may include loss of life, property, etc. from a specific fire.

Disaster data for general fire trends Data from economic sources, insurance estimates, and emergency officials may include loss of life, property, etc. from general fire trends.

### Actors

A character must be identifiable to be considered here. “Environment” or “Wildlife” is not enough, but “Horsetooth Reservoir” or other identifiable, anthropomorphized, or charismatic places and animals are sufficient.

HERO/Fixer: actor(s) who plan to or fix, solve, assist, or seek to resolve past, current, or future problem. Need to possess intention and/or agency. **IF RESCUERS, NOTE WHETHER THEY ARE HEROES FOR THE HAZARD RESPONSE OR FOR THE POLICY SOLUTION.**

VILLAIN/Problem Causer: actor(s) who create, cause, contribute, instigate, exacerbate, or plan to contribute to the problem. Need to possess intention and/or agency. (make note, however, of more vague villains such as “development” or “growth in the WUI.”)

VICTIM: actor(s) who suffers, is targeted, is affected by the problem and/or Villain.

Q19. Identify who in the document is portrayed as each actor type.

Mitigation Information

When coding each article, think about what a resident living in the community would take from the article.

Q20. Does the document provide formal or informal risk information for the local community or surrounding area?

1 Yes: The article provides information that a resident would need to understand their risk of being affected by a natural hazard

2 No: The article provides no information on risk

Q21. Does the document provide information about what residents can do to be prepared or reduce their risk on their own property before a fire occurs?

1 Yes: The article provides information that a resident would need to understand risk reduction strategies on their private property

2 No: The article provides no information on risk reduction