Managing the Risks of Risk Management on Large Fires[1]

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Abstract

Large fires pose risks to a number of important values, including the ecology, property and the lives of incident responders. A relatively unstudied aspect of fire management is the risks to which incident managers are exposed due to organizational and sociopolitical factors that put them in a position of, for example, potential liability or degradation of their image as a leader. This paper explores the hypothesis that the concept of risk in large fire management extends beyond the potential for physical harm and includes perceived potential damages in the form of social harm that can accrue to fire management personnel. A set of fires from USDA Forest Service Regions 5 (Pacific Southwest) and 6 (Pacific Northwest) for the years 2009 – 2013 are selected based on cost (>$5,000,000) and examined using a combination of structured interviews and a self-report protocol to elicit and codify the experiences of fire managers (including line officers, fire staff and incident commanders) with regard to a range of risks associated with incident management, including sociopolitical factors that influence incident management and perceptions of career risk. The resulting information will be modeled in terms of the relationship between incident manager perceptual factors and decisions on the incident. Identifying these factors not normally recognized and/or explicitly taken into account in fire managers' decision making process would, hopefully, lead to an acknowledgement and internalization of these factors in their decisions.

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Introduction

The purpose of risk management is to reduce the potential for harm associated with exposure to hazardous conditions by taking appropriate actions. In general, risk management is conceptualized as a response to the findings or conclusions of a risk assessment by which hazards are identified, exposures are assessed and risks are characterized (National Research Council 2009). Essentially, risk management is a problem in risk-based decision making, and the central focus of risk management is deciding between alternative risk-reduction measures. Although this process gives explicit consideration to risk-related factors associated with exposure to hazards, it gives little to no consideration to the risks emergent from the risk management process itself. Indeed, given the inherent uncertainties associated with risk management, the outcomes of risk reduction actions cannot be known with certainty. As a result, even the best-intended risk assessment and risk management plans can lead to undesirable outcomes. From this perspective, risk management is an exercise in decision making under uncertainty for which the decision maker is accountable for the full range of outcomes, both intended and unintended.

To date, applications of risk management decision making have focused on the risk management problem as external to the decision maker, and is done on their behalf in support of a decision. That is, risk assessment provides the framework for the identification and implementation (including monitoring) of risk management efforts. Consider the case of wildland fire where fire managers use risk assessment as the basis for determining the potential impacts of fire on values at risk (e.g., natural resources, private property), as well as risks to those exposed to the hazards of wildland fire as part of risk management (e.g. wildland firefighters).

Two key elements receiving little attention in risk management research are related to the risk management decision maker as a personal agent, and the broader social context within which the decision maker operates. These two elements can be characterized as risk to career and risk to social capital.

Risk to Social Capital

With respect to social context, many risk-based decisions impact not only the organizations with which risk managers are associated, but also impact stakeholders outside of a risk manager's organization with consequences to social capital. In some risk management contexts, the impacts to social capital can have an influence beyond

a specific risk management situation (e.g., wildland fire) and into other management areas where social capital is critical to the risk manager's success as a decision maker (e.g., NEPA actions). Similarly, risk managers working together on a risk management situation (e.g., line officers and incident commanders) may rely on social capital to accomplish their work with quality and efficiency, but have social capital associated with their working relationship at risk due to elements of the situation (e.g., high stress, leadership capabilities).

We use the concept of social capital to refer to resources such as trust, information and social norms, as well as a tendency on the part of a decision maker to engage in collective actions with stakeholders that have mutual benefit (e.g., Bourdieu 1986, Coleman 1990, Fukuyama 2002, Paromita 2009). Implicit in this definition is a relatively stable social network of relationships that is somewhat durable though not necessarily fully resilient with respect to the impacts of unmet (implicit) social expectations. Hence, social capital is at risk whenever the actions of a decision maker could result in violations or breaches of social bonds established through patterns of interaction and negotiation.

Risk to Decision Maker Image and Career

Risk managers may face potential impacts to their image and career as a function of the outcomes of risk-based decisions that they make. For example, pre-tenure academics working across traditional disciplinary lines have been found to experience career risk when they pursue research agendas that are focused on interdisciplinary problems such as climate change (Fischer, et. al. 2012). As yet, we have little in the way of models of how career risk might factor into risk-based decision making as part of risk management, though we do have some anecdotal evidence that in the domain of professional investment decision making a significant challenge for investment professionals is dealing with career risk and job protection as an investment agent (e.g., Grantham 2012). Observations of investment professionals suggest that risk managers concerned about career risk may overly focus on what other risk managers are doing or have done in the past, thereby creating a herding tendency toward inefficiencies in investment behavior. Put more directly, perceptions of career risk may drive risk managers to excessive avoidance of error or negative outcomes (risk aversion), and over-attention to behaving as others have done to avoid being wrong or erroneous on their own.

Study Context

Risk is inherent to fire management. Large-scale incidents, such as those that cost millions of dollars to manage and suppress, present multiple sources of risk, including risks to incident personnel as well as risks to the resource base in the form of damage from fire and from fire suppression activities. Decision making in the context of large fires is the basis for risk management, and a complete understanding of how decisions are made cannot be had without understanding the multi-dimensional characteristics of the risks associated with fire and fire management on these large-scale events (MacGregor 2006).

In recent years, the focus of decision making on large fires has centered around cost and cost management. With growing evidence that not only are fires becoming more costly and larger in size is the discomforting finding that firefighter fatalities have increased as well. Nonetheless wildfire costs on a per-acre basis, particularly for the largest of fires, are not reliably predictable from biophysical features of the fire context alone. It is clear at this point that however decisions drive large fire costs, they are not doing so based on exogenous features of fire, including size, values at risk, fuels, topography, etc.

This research takes the perspective that in the context of large fire management, risk is a multi-dimension construct that includes multiple hazards and consequences. Damage to the natural and built environment is among these hazards, as is potential harm to firefighters and the public. These forms of hazard are generally well accounted for in the decision making documentation that accompanies large fires. For some of these risks, mitigation measures are set in place, such as safety training for firefighters, evacuation of the public, and interventions that promote pre-incident preparedness for homeowners in the form of defensible space.

A feature of large fires that is commonly identified as contributing to cost is a relatively broad category of hazards that might be conceptualized as sociopolitical in nature. These include the potential damage or harm to the agency's image or the image of the fire managers for failing to take action even if that action is not likely to achieve a positive value with respect to managing the physical properties of the fire (e.g., spread, damage, intensity). Research on the role of trust (as an element of social capital) has suggested the importance of trust in effective and efficient natural resource management (e.g., Cvetkovich & Winter 2007, Liljeblad & Borrie 2006). However, we have no research to date that identifies the pathways by which social capital (and trust) enters into fire management decisions that occur at the time of an incident. Such decisions would include level of resources assigned, relative aggressiveness of strategies and tactics, overall efficiency of incident response, and responses to media events.

We hypothesize that the concept of risk in large fire management extends beyond the potential for physical harm and includes perceived potential damages in the form of impacts to career or impacts to perceptions of leadership or management social harm that can accrue to management personnel. These perceptions may arise from a generalized belief that it is better to do all that can be done even if that activity does not produce a positive physical result, but does produce a valued psychosocial result. The hypothesis is based on the notion that risk management can have as its goal or objective a variety of purposes, some of which are non-physical.

The implications of this hypothesis extend to alternative approaches for accounting for the costs of large fires. Fire management strategies and actions fielded in the interests of sociopolitical concerns, and to achieve sociopolitical objectives may significantly impact fire costs. These impacts may be well beyond those due to the physical attributes or characteristics of values at risk (e.g., critical infrastructure). The research proposed here will help lead us in the direction of a more complete identification of fire management strategies as a predictor of large-fire cost.

Methods

The methodology for this research is based on a combination of structured interviews and self-reports of fire managers, including agency administrators, fire management officers and incident command staff that synthesizes their experience on specific fire incidents. In addition, information is also gathered from a number of existing fire-related databases, particularly the Fire & Aviation Management web site (FAMWEB), the Wildland Fire Decision Support System (WFDSS), and the on-line incident website InciWeb.

A self-report protocol has been developed that also serves as a structured interview guide. The protocol was designed to be brief yet comprehensive with respect to the potential influences of social factors on incident decision making, and includes:

- Political influences and pressures, including direct involvement from influential individuals (e.g., elected officials), and influential groups (e.g., cultural/tribal, public groups).
- Media reporting and coverage, including type of media (e.g., broadcast, print, internet), timing of media reporting with respect to the incident timeline and actions taken in response to media reporting.
- Actions taken to manage sociopolitical pressures or objectives, including incident strategies, incident tactics, changes in objectives, and changes in number and type of suppression resources.

Additional information on each incident is obtained from the three databases indicated above. FAMWEB provides access to the daily reporting format ICS-209 that documents on a regular basis the status of an incident, including its size, staffing, values at risk and management objectives. WFDSS provides (in many cases) more comprehensive information on incident strategies, values at risk and decision rationale. InciWeb provides a highly accessible overview of incidents that is updated on an on-going basis, and provides an early indication of incidents that that are suitable for study.

Incidents are selected over a five-year period, beginning in 2009 and ending with the 2013 fire season for USDA Forest Service Region 5 (Pacific Southwest – California), and Region 6 (Oregon & Washington). Only incidents that are wholly (or primarily) on lands under USDA Forest Service jurisdiction or are managed by a USDA Forest Service agency administrator are selected for study; are managed by either a Type I or Type II incident management team (IMT); and have a cost of $5,000,000 or more. However, we have been tracking incidents down to the $>2,000,000 level to increase the potential size of our database. Fire years 2009, 2010 and 2011 were relatively slow in Regions 5 and 6 and fire costs were somewhat lower than average.

For each incident, an Incident Time Line is prepared based on information from the various information documentation sources discussed above. In addition other incident information is encoded, including key events, fire cause, fire size, peak resource levels, strategies & tactics, occurrences of injuries & fatalities, and threats/losses to critical values (e.g., residences).

Preliminary Results

As of the date of this writing we have established a database of 32 large-fire incidents according to the criteria outlined above (23 in Region 5; 9 in Region 6). These fires are for the 2009, 2010 and 2011 fire season. For the 2012 fire season, we are currently adding cases to the database. Although it is too soon to draw firm conclusions, we do have some speculations based on preliminary results.

- The terminology "sociopolitical" appears to apply to a wide range of social factors that have a relationship to a fire incident; this can include factors that influence incident decisions (such as local interest groups, political stakeholders) and factors that are the result of incident outcomes. As one fire manager put it: "Values at risk that have sociopolitical implications depending on the outcome." Thus, sociopolitical factors appear be both an influence on fire management, as well as an outcome of fire management. Previous modeling efforts have identified distinct categories of sociopolitical

factors and characterized them in terms of legacy, pre-incident and incident-specific influences (MacGregor & González-Cabán 2008).

- There appears to be a category of incidents that are *linked* to other incidents through elements of social capital. In these cases, a fire incident occurring at one place and time may have its management response guided in part by social capital considerations from an earlier fire in which social capital was lost or degraded by features of that earlier incident. Incidents linked in this way are not "visible" through the biophysical features of the fire environment, but are instead linked through social implications of incident management and incident outcomes.

- Beginning in 2009, the USDA Forest Service undertook a significant national-level effort to introduce structured risk assessment and risk management principles into fire management. This effort placed emphasis on careful consideration of firefighter exposure to the inherent risks of wildland fire and called for balancing those risks against the likelihood of success of fire management operations. In addition, a structured approach to risk assessment was established that called for an explicit consideration of alternative fire management strategies or "prospects" that contrasted a range of levels of engagement from more aggressive (e.g., direct attack) to less aggressive (e.g., indirect attack, point protection). The effects of this effort are more visible in fire management for the years 2010 and 2011, and appear to be even more so in this year, 2012.

- Social capital is a general resource that has value and utility across a wide range of unit management activities, and particularly non-fire projects that constitute the plan of work associated with resource management. When social capital is impacted by fire management there appears to be a *transfer effect* by which social capital is diminished for other non-fire uses such as projects requiring public scoping and review under the National Environmental Protection Act (see MacGregor & Seesholtz 2008). This effect may be moderated by the degree to which publics are clustered or segmented in terms of interests. The type and extent of this compartmentalization may be variable across management units and differ with management situations.

- In some fire management circumstances we have observed that agency administrators may have difficulty assessing the extent to which they have social capital and may tend to over estimate the amount of social capital they have.

- In general, media reporting appears to lag rather than lead incident decisions for the type of fires selected for study. However, more analysis on this point

is required before it is clear how and to what degree media reporting interacts with incident decision making.

- The concept of career risk, though anecdotally characterized in terms of termination, appears in reality to be more complex and better characterized in terms of ability to function effectively and efficiently.

- Fire managers have significant concerns about how they are perceived as leaders by both their staff and by stakeholders. Perception of leadership appears to be an important component of career risk in that loss of leadership image may significantly impact the ability of fire managers to function in roles that are part of their non-fire activities (e.g., agency administration).

Summary

Risk management is inherent to fire management, and in that context extends beyond the biophysical characteristics of fire to include social and managerial factors. Two broad classes of such factors include risk to fire managers' leadership image and risk to social capital. The present study, currently underway and not yet completed, suggests based on preliminary results that taking a broader perspective on risk may provide a pathway forward for understanding factors that influence risk-based decision making in ways as yet unaccounted for. Identifying these factors not normally recognized and/or explicitly taken into account in fire managers' decision making process would, hopefully, lead to an acknowledgement and internalization of these factors in their decisions.

Acknowledgement

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