Information Flows During WildFires

Toddi A. Steelman, Ph.D.   Department of Forestry and Environmental Resources, NC State University
        Toddi_Steelman@ncsu.edu (919) 513 0408
Branda Nowell, Ph.D. and Deena Bayoumi, School of Public and International Affairs, NC State University
Sarah McCaffrey, Ph.D.   USFS Northern Research Station

Effective information flows are important to manage a wildfire event, avoid injury or loss of life, protect personal and community assets, maintain vital services, connect key participants on the fire, and build relationships and trust among those involved in the fire.   At present, little empirical work exists to document how information flows during a fire event. In this research, we used social network analysis to better understand information processes in fire management.

To explore these issues we developed a study to interview a range of key individuals during four fires, one in 2009 to pilot test the process and three during the 2010 fire season. Key questions posed in this research included: 1) Who has what kinds of information? 2) What kinds of information do people need? 3) Are some vehicles of information exchange more /less effective than others? 4) How are parts of the information network linked with other parts? And 5) Can some relationships be leveraged more effectively than others?   Below we report on the results on the first of the four fires. There are inherent limitations in drawing conclusions from a single fire as a number of local factors may influence information flows on a fire. As such, our research may not be broadly generalizable. However, we believe that some of the findings will be of interest to fire managers and communities where fire is a threat. The additional work in 2010 will help us identify how the findings compare to these results from 2009. A more extensive discussion of this research exists in a PowerPoint presentation and other publications. Please contact Toddi Steelman (address above) for copies.

RESEARCH SITE

In the summer 2009, our research team traveled to the Hat Creek Complex in northern California. Approximately 130 structures were threatened and 400 people were affected by three fires that burnt a total of 11,269 acres and cost $7.7 million to suppress. Evacuations took place over a four day period along with highway closures, burned over power lines, poor cell phone coverage and downed telephone lines. We interviewed key individuals from the local national forest and on the Type 2 Incident Management Team who helped manage the fire. We also interviewed members of the local community who had a formal role in the fire (e.g. Sheriff, County fire, Highway patrol) and key community information brokers, individuals who had informal roles and were sought out by other residents. We asked all participants in the study about the types of information they needed, where they got it, and how adequate it was for their purposes.

RESEARCH FINDINGS

Types of Information
We identified 13 different types of information that participants in our study needed. Some types were more commonly identified than others. For instance, fire status and behavior (100% of participants identified as important to them), evacuation and road closure (60%), inter/intra unit communication (48%), fire resources status and availability (40%), and values at risk (32%) were more common than information administration, infrastructure, fire potential (20% each), fire costs (16%), Wildfire Decision Support Systems (WFDSS) (8%), in-briefing package (4%) and cause of fire (4%). Different participants used and demanded different types of information. The IMT demanded, on average, seven different information types, while the local national forest demanded four information types and the local community agencies demanded three.

Information Sources
How did people go about getting the information they needed? It is important to note that the vast majority of information (73%) was sought and received via person-to-person communication such as email, phone, two-way radio or face-to-face interaction. In other words, information flow during the wildfire was largely a product of interpersonal communication. Although they were less frequently used as a source, information was also sought and received through attendance at meetings (14%) or monitoring other media (14%), such as written reports, newspaper, websites, monitoring radio traffic, listening to broadcast radio stations or information hotlines.

Adequacy of Information
The information that was most adequate and most trusted came from the Incident Management Team. The individuals we interviewed seemed to prefer receiving information from official sources and primarily accessed unofficial information sources (e.g. websites, radio, TV, newspapers, neighbors, etc…) when official communication channels broke down. People in the network wanted to hear from the IMT and trusted what they had to say. Hence, it is important that the IMT recognize and effectively leverage this reputational capital.

Key Supplier/User of Information
The IMT is the focal point for bringing information into the system and getting it back out to others during the wildfire event.   It serves as a central clearing house for all types of information – even for information concerning topics, such as evacuation and road closures, that stand outside of the IMT's direct scope of authority and responsibility. For this fire, the IMT Public Information Officer was both the primary supplier of information and the primary user of all information types during the event. While this may seem like common sense, our research empirically validates the role of the PIO. Other members of the IMT Command and General Staff were also key suppliers and users of information.

Information Network and Sub-networks
A very extensive information network exists on a fire. Within this broader network are several sub-networks. For example, information flows concerning road closures and evacuations may include a slightly different set of individuals than the network that is associated with ascertaining fire status. This is because not everyone needs all types of information.   These sub networks specialize in different information types with different people seeking and supplying information. Two dominant problems can arise in these sub-networks: 1) when links between key people do not exist; and 2) when the right type of information does not flow between people.   Key questions to ask include: Are you effectively linked to the right people? Are you passing along the right information?

PROBLEM AREAS

Evacuation and Road Closures
Community information brokers received the least adequate information overall and more specifically the least adequate information about evacuation and road closures. This is not an insignificant problem since these community members were most directly affected by evacuations and road closures. Community information brokers ranked community agencies (e.g. Sheriff's department, County fire, Highway patrol) as supplying the least adequate information to them. Our research suggests that in some cases adequate links between community agencies and community members exist, but inadequate information is passed between them. In other cases no links exist through which information can be passed. Both problems could be addressed with the assistance of NIMO, IMTs and the local forest.

Local Context Information
Both local community agencies and community information brokers were critical of the IMT's use of local context information. Locals would like to see their resources, knowledge, and assistance utilized on the fire. Volunteer Fire Departments expressed a need to have a presence within their community when it is threatened by wildfire.   They felt their community expected them to play an active role in local firefighting efforts. A failure to engage the Volunteer Fire Departments in fighting wildfires proximal to their communities was identified as a source of substantial frustration and resentment. Others expressed a desire to have their knowledge of local weather patterns, cultural resources and topography to be taken into account. In some cases, no links to the IMT exist to facilitate the transmission of this information. In other cases, local context information does not adequately pass from one person to another to be better utilized. We see two potential relevant questions: 1) Structural—does the IMT need better links to the external community to understand how their resources can be put to better use? 2) Communication—does the IMT need to relay existing information better within itself and to others who can utilize this information and put it to better use?

Evacuation and road closure information and local context information traditionally have not been the responsibility of the IMT. However, local community members expect them to have evacuation and road closure information and believe that better fire management could result from the inclusion of local context information. What are the barriers to the IMT incorporating this information into their work?

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KEY TAKE AWAY POINTS

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►Two Information Problems

Information flow problems can come from two primary sources— breaks in structure or ineffective communication between people.

- First, if there is a break in structure this means two people do not have a way to connect with each other. In essence, a break in the network exists. Senders and receivers need to ask, "Am I reaching out to the right people?" "Who is not connecting to me that should be?"
- Second, ineffective communication means a link may exist between two people, but information is not effectively or adequately passed between the two. Senders and receivers need to know "Am I getting the information I need?" "Are you getting the information you need?"

Lessons for IMT

Leverage your reputational capital. People in the networks trust you and think you have good information. They want to hear from you!

You are the primary supplier and consumer of information during the fire. Do you have the right links to the right people? Are you getting the information you need? Are you passing along the information others need? Remember that local residents are least satisfied with the information they get.

Locals look to you for ALL types of information (even if it is not your responsibility). Locals assume the IMT should have all information relevant to the fire—even if it falls outside the accepted purview of IMT responsibility. For instance, IMT's might assume they do not need to worry about evacuation information as that is a "local issue", but oftentimes locals are looking to IMTs for that very information. Keeping this role in mind it is important that you establish structural ties and adequate communication about evacuation and road closures and other important local context information.

When your official sub-network fails, people go to alternative sources. The official network often does fail during a fire when phones or email goes down or roads are closed that prevent person-to-person contact. This means people will seek information from sources that they actually perceive as less adequate and trustworthy because they cannot get it from you.   Pro-active planning and redundancy in your role can be important here.

Lessons for Local Forest

You play an important bridging function before the fire. You can strengthen ties between local agencies and key community members before the fire. How can structural ties be strengthened before the fire? How can information flows be improved, especially when it comes to evacuation and road closure and local context information? Evacuation drills could help trouble shoot problem areas. Community wildfire protection plans could help bring together key actors.

You are key to local context information during the fire. What information is most important to understand your local context? Your local context includes information about your local forest as well as information from local agencies and key information brokers in your community. Who has key information and how do you get it to the right place? The IMT depends on you for this.

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You can help facilitate good information flow during transition times. Transition to the IMT is a chaotic time with lots of anxiety and fear. People in the community want to hear from official sources as soon as possible throughout the fire. What role can you play in information delivery to locals prior to IMT arrival? Set up trap lines where information should flow. Reach out in person to the community where possible. Give the IMT clear direction upon their arrival about what you have done and how they should follow through to be consistent. Identify areas that you think the IMT should focus on to alleviate anxiety and fear.

Lessons for NIMO

You can facilitate discussions about important local context information before the fire. What local context information is most important to the community? What local context information is most important to the local forest? How can structural ties be strengthened or created between the local community and the local forest to understand who has key local context information? Likewise, if structural ties exist, how can information flow adequately between the local forest and the local community? How will this information make it to the IMT upon their arrival?

You can facilitate discussion about evacuation and road closures before the fire. Without good pre-planning, breakdowns often occur between local agencies and the local community during a fire. The role of the IMT is often not clear when it comes to evacuation and road closures. How can structural ties be strengthened or created before a fire between the local agencies and the local community to understand who has key evacuation and road closure information? Likewise, if structural ties exist, how can information flow adequately between the local agencies and the local community? What is the appropriate role for the IMT in the evacuation and road closure sub-network? Establishing evacuation and communication plans ahead of time and carrying out drills can help identify strengths and weaknesses at the local level and anticipate what role the IMT should play.

You play a bridging function between the local forest and IMT. People want to hear from official sources as soon as possible during fire. You can facilitate a discussion about how the local forest can play this role until IMT arrival. What types of information is most important to the local forest, local agencies, local community? Who are the key people to get information to? Who will get this information to them? Role playing at the local forest level can help identify how communication can be handled during a fire and what role the local forest would like the IMT to play upon their arrival.