2010

The Evolution of Emergency Management Networks: The Brazos County, TX Evacuation Network from 2000-2009

Scott E. Robinson

Texas A & M University - College Station, srobinson@bushschool.tamu.edu

Follow this and additional works at: http://opensiuc.lib.siu.edu/pnconfs_2010

The Evolution of Emergency Management Networks: The Brazos County, TX Evacuation Network from 2000-2009

Scott E. Robinson
Bush School of Government and Public Service
Texas A&M University
srobinson@bushschool.tamu.edu

DRAFT: PLEASE DO NOT QUOTE
WITHOUT THE AUTHOR'S PERMISSION

April 17, 2010

Abstract

Emergency management is a field in which collaborative activities are inescapable. Emergency planning and response increasingly involves a diverse array of actors across field (emergency management, public health, law enforcement, etc.), sector (government, nonprofit, and for-profit), and level of government (local, state, and federal). The necessity of collaboration is built into the logic of escalation in the Stafford Act and the nature of emergency events as boundary spanning threats. While the necessity of collaboration is clear, the dynamics of this collaboration are less well understood. This paper assesses the temporal dynamics of an emergency management network in a moderately sized community in central Texas. The evolution of the network between 2000 and 2009 make clear that actors are both quick to join and to leave the network while the network maintains its centralized character throughout the time period.

1

1 Introduction

Public administration and political science are currently focusing quite a bit of attention on issues related to political and administrative networks.[1] The Public Administration Review devoted an entire special issue to the subject in 2005 and the American Political Science Association created an specialized organized section on the subject of political networks. While attention to collaborative public management and policy networks is high right now, this is by no means a new subject. The classic argument of the dominance of iron triangles or policy whirlpools is a network argument - albeit of a small network (Redford 1969). The counterargument that policy tends to involve broad and fluid participation in issue networks is also rather obviously a network construct (Heclo 1978). More recent integrations of the literature positing changing levels of participation over time and across policy areas suggest that these networks can evolve over time as characteristics of individual policy domains change (McCool 1998, Sabatier & Jenkins-Smith 1993).

While attention to issues of administrative and policy networks has been a component of the policy literature for decades, the dynamics of the networks across time has proven to be a difficult subject to study. Due to extraordinary demands on data and the necessity of novel inferential techniques for data involving networks, very little work has engaged issues related to network change. This paper represents an initial (and tentative) step toward assessing the evolution of emergency management networks across time - in this case over a decade involving two major events. The next section (Section 2)will discuss some of the existing literature on issues related to the incorporation of new actors into a policy network and the evolution of network characteristics over time. The result will be a series of propositions about the nature of emergency management network change. Section 3 will introduce a new data set on a single policy network over a decade. Over this section, the paper will assess the evolution of the network over time to assess the fit between the theoretical expectations in the previous section and the observed changes in the emergency management network. Finally, Section 4 will provide some

summary thoughts and a discussion of plans to extend on this initial study.

2 Network Recruitment

A driving question of research into policy and administrative networks is the scope and fluidity of participation. The key characteristic of policy subsystem approaches to networks was the emphasis on closed and limited participation by predictable actors (e.g. congressional subcommittees, interest groups, and agencies). The principle critique of the argument was the participation in actual policy domains tends to be much more broad and fluid. It was argued that a large variety of actors may participate within any policy network including those envisioned by subsystem theories as well as representatives of other levels of government and even public interest groups. Furthermore, the participation level of various actors is thought to change over time with some actors dropping out of active participation while new actors emerge at different time. An issue network represents an extreme version of this open and fluid network (Heclo 1978). A key question, then, is the scope and fluidity of participation in actual policy networks. The next subsection will discuss the issue of participation in emergency management networks specifically. Following that specific discussion, I will discuss some specific propositions from the literature regarding the evolution of emergency management networks.

2.1 Networks and Emergency Management

Over the past two decades, the importance of collaborative networks has become clear to scholars specializing in emergency management. Emergency management represents a classic wicked problem (O'Toole Jr 1997). Emergencies tend to cross jurisdictional boundaries due to the geographic scope and the broad range of consequences they present. For example, Hurricane Katrina devastated communities across multiple states and mobilizing reactions from a variety of government agencies (emergency management, law enforcement, transportation, public health, housing and welfare, etc.) and nongovernmental agencies (the American Red Cross, Walmart, local religious institutions, etc.).

Among the most prominent voices for research into collaboration and networking activities in emergency management has been Louise Comfort. Comfort has argued that emergency management networks are best understood

as self-organizing systems (Comfort 1994). The emphasis in her account is fluidity of participation and the inability to predict mobilizations ex ante. Rather than following documented plans or stable expectations, mobilization tend to involve an unpredictable set of actors that vary greatly in terms of prior disaster experience, organizational sector, and other characteristics.

Concluding that mobilization is unpredictable is unsatisfying in a number of ways. First, it suggests that efforts to plan mobilizations are doomed to failure. If one can not predict who will be involved - at least in terms of some core players - then one can not know whom to involve in emergency planning. Second, to the extent that exercises and other simulations are key preparatory (and possibly even evaluative) elements of emergency management, if one can not predict who will mobilize following an emergency event then one will not know who to include in an exercise. The limited composition of exercises preceding Hurricane Katrina has been identified as a key cause of the eventual problems in evacuating residents of New Orleans with limited access to transportation (Kiefer & Montjoy 2006).

However, the difficulty in predicting which organizations will mobilize in an emergency may have been overstated. In a study of the mobilization of evacuation hosting activities in the Dallas/Fort Worth, TX area following Hurricane Katrina, Robinson, Berrett & Stone (2006) found that the mobilization of many organizations was predictable given a series of prior relationships. Relationships that sometimes had little to do with emergency management and evacuation hosting activities served as a basis for the emergence of a series of response networks. While there was also evidence of spontaneous mobilization of organization with no prior membership in emergency management networks, a good part of the network - particularly the network leadership - involved prior relationships that could easily escape the attention of emergency management scholars. The case studies collected in this article provide some hope that relationships can be managed and that mobilizations can be predicted (within some bounds).

The complexity of the mobilization and management process of emergency management networks has raised important questions about the management and leadership of these networks. Waugh & Streib (2006) argued that coordination is difficult within emergency management networks despite recent attempts to provide structure to the networks through such devices as the National Incident Management System (NIMS) and the Integrated Command System (ICS). The difficulties in leadership are accentuated given the diversity of these networks. Actors from diverse sectors and policy areas

4

bring with them a variety of assumptions about the nature of emergencies and appropriate forms of coordination and communication(Comfort 2007).

2.2   Propositions for Network Evolution

Given the importance of network collaboration to issues of emergency management, research into the development and evolution of these networks is essential to the improvement of management of emergency preparedness and response networks. This paper will focus on expectations surrounding the key characteristics that distinguish subsystem models from issue network models of policy networks: scope of participation and fluidity of participation.

In terms of scope of participation, there is no bright line distinguishing high from low levels of participation. Most of the research has been at the federal level of policy making complicating predictions at local levels. Instead, I will focus on volatility in the number and connectivity of networks within the sample.

Proposition 1: Emergency management networks will experience volatility in membership.

Volatility can take on a number of meanings. One can experience volatility in the aggregate number of network members. However, involving more organizations may not be as important as increasing representation from diverse types of organizations. While I could focus on a number of types, I will focus on representation of policy sectors (e.g. emergency management, law enforcement, education, public health, etc.) and private sector organizations. This focus results in two specified propositions.

Proposition 1a: Emergency management networks will experience volatility in network size.

Proposition 1b: Emergency management networks will experience volatility in network diversity (in terms of policy sector representation).

3   Data and Methods

Testing these propositions requires data with a particular set of characteristics. The dataset must record participation and interconnectivity between actors within emergency management. Furthermore, the observations must be ordered so that a time path is clear. Ideally, the time path should record participation over a number of years, preferably at least a decade

(Sabatier 1993). Hypothetically, one could conduct interviews or surveys annually over a decade but such efforts are incredibly expensive and rare. The twin needs of comparable measurement and available data across time are best (or at least, easiest) served by documentary analysis.

We have selected to use newspaper searches to generate a database of documents. Our goal was to create a single system for collecting journalistic coverage of emergency management networks that could be used for a variety of communities across time. For purposes of this study, we are focusing attention on evacuation related activities (within the entire realm of emergency management). We elected to search within the Westlaw database using the substantive search term "evac!". This will capture all words that begin with the letters "evac" including evacuation, evacuate, evacuee, and the like. The Westlaw database allowed us to search all newspapers and news wires - to ensure we captured local as well as national media sources. The use of media reports to reconstruct networks was inspired by Comfort's (2006) study of response networks to Hurricanes Katrina and Rita.

We next needed to locate comparable communities. We were interested in evacuation hosting activities so we identified communities that had recent (within the last decade) experiences with evacuation hosting activities. We also choose communities that were relatively similar in terms of population size. For this reason we chose moderately sized communities rather than the largest cities where the variances in size are large in absolute terms. For each community, we added geographic limiters to the substantive search term including the major cities and the county in which the community resides. For example, we looked for articles that included a term starting with "evac" and also included either "College Station", "Bryan", or "Brazos County." Given the varying roles that county and city official play in emergency management, we felt it was essential to search based on city and county.

These searches of the Westlaw database resulted in hundreds of hits for each year of our sample (2000-2009). [2] Each of these articles were then read individually to ensure that the article was germane to issues of evacuation. This eliminated many articles. Some articles included references to entertainment or sporting events in the target community (such as Texas A&M University sports teams) and coverage of something having to do with an

---

[2]Aggregation of the articles to annual sets could be problematic if the division between December and January were arbitrary. In the case of evacuation hosting, though, almost all activities are during the hurricane seasons in the Spring and Fall. There is little activity in the winter and thus calendar years make a reasonable division

evacuation in a different community. We only selected articles that involved an evacuation or evacuation hosting activity within the target community. We then read each of the selected articles to identify all organizations mentioned. If two organizations were mentioned within a single article, those organizations were taken to be "co-mentioned." We take this to be a low threshold indicator of association. For each year, then, we have a list of all mentioned actors and all cases of co-mentions. We use these data to create a series of annualized maps of the community evacuation management network. I am in the process of collecting data on six communities using this method. In this paper, I will limit my attention to the data generated by the study of Brazos Valley, TX. The following sections will describe the evolution of the Brazos Valley network.

3.1 Brazos County 2000-2004

Brazos County lies in central Texas located between Houston, Dallas, Waco, and Austin. This community is known as the home of Texas A&M University and lies along a primary evacuation route for communities along the Gulf Coast of Texas - including Houston and much of East Texas. As a result, officials in Brazos County had active roles in the evacuations related to Hurricanes Katrina and Rita in 2005 and Hurricane Ike in 2008. This section will detail the emergence of the network before the massive activation of hosting activities in 2005.

The initial figures indicate the rudimentary status of the evacuation network in Brazos County in 2000. There are only three actors active in the first year - with the university serving as a hub connecting the two other actors. The central position of the university will be consistent throughout the time period.

In 2001, the scope of the network increased to include a variety of local and national institutions. National institutions such as FEMA and the American Red Cross appear connected to the university. A few units formally connected to the university also appear - including the Hazard Reduction and Recovery Center, the Extension Service, and the emergency response training unit. A state institution (the Texas Department of Transportation) also appears along with a separate triad including the Texas A&M Health Science Center's School of Rural Public Health, the EPA, and a state natural resource organization. The two unnamed nodes appearing on the figure (v2 and v3) represent actors that have appeared previously (in this case, in
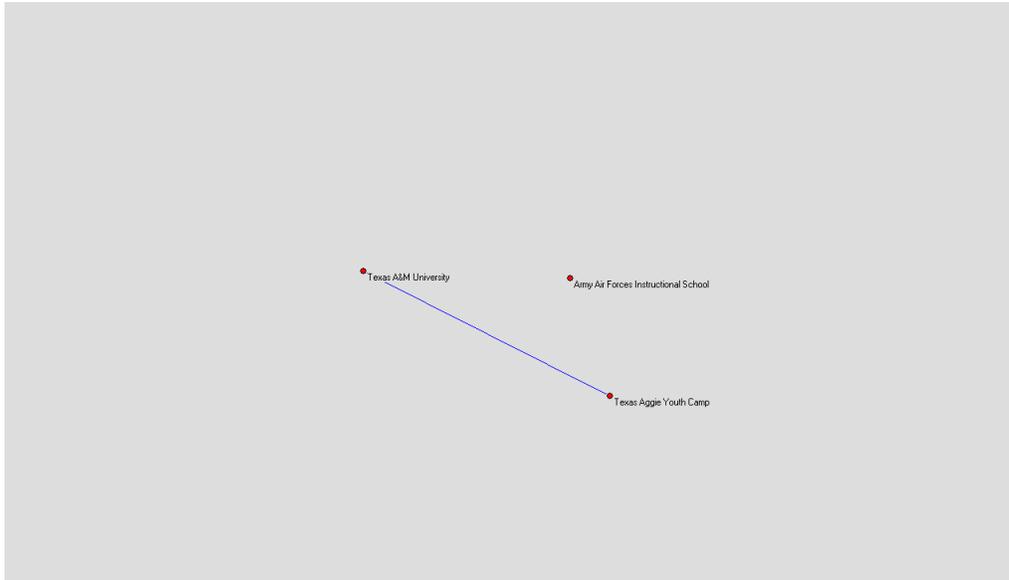
Figure 1: Brazos County Network 2000

2000) but who were not mentioned in 2001. The disappearance of two of the three actors from 2000 to 2001 speaks to the fluidity in participation in the network.

A look to Figure 3 shows that the patterns of the university, the central actor, and many organizations leaving the network after one year continues. The university connects a cluster of organizations focused on hurricane issues to a separate cluster of state agencies (the Texas General Land Office, the Texas Department of Public Safety, and the Texas Parks and Wildlife Service) in addition to the FBI. It is remarkable at this point to note the variety of organizations engaged in issues of evacuation. In addition to the policy areas listed above (land regulation, public safety/homeland security, law enforcement, and meteorology) there is a state level public health organization. While the network is centralized, it is quite diverse. Furthermore, many of the actors present in 2001 drop out for 2002 indicating continued fluidity. The take-up of new actors exceeds the departure rate, so the network grows. However, the growth is despite a significant departure rate.

As Figure 4 indicates, the size of the network collapsed in 2003. The number of actors mentioned dropped off. The university's central role is persistent - as is the relative diversity of policy fields. Again we have repre-
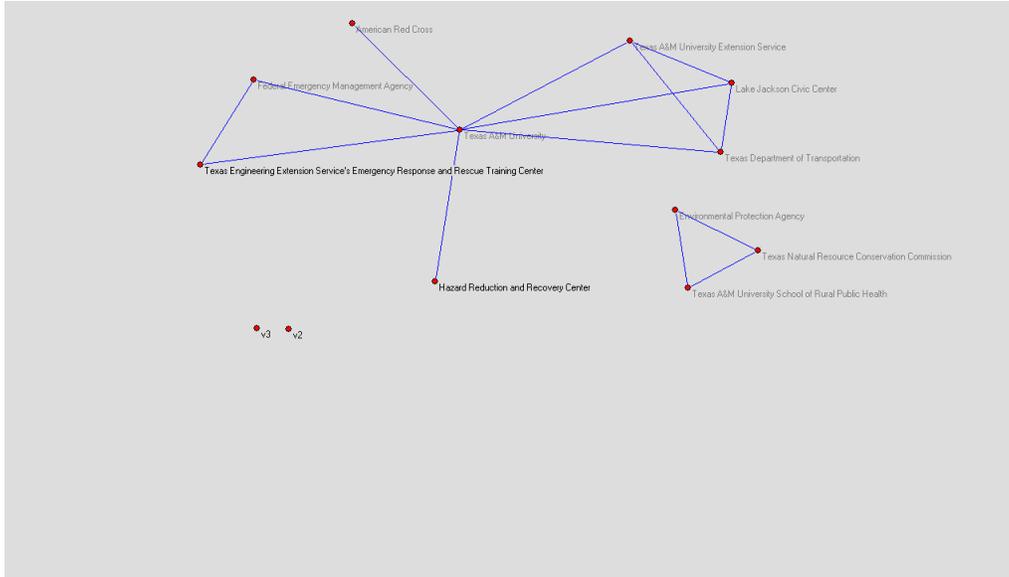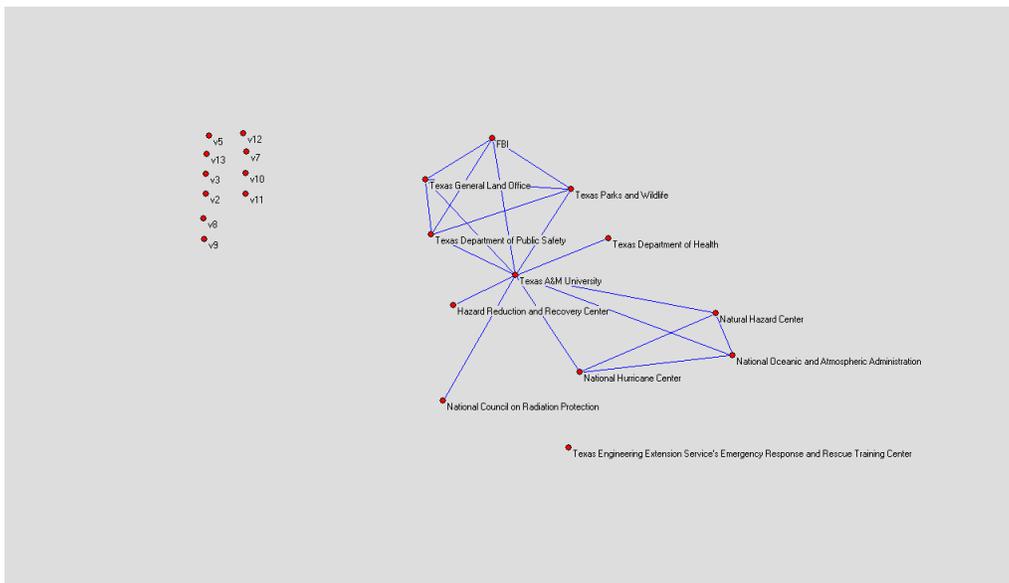
8

Figure 2: Brazos County Network 2001
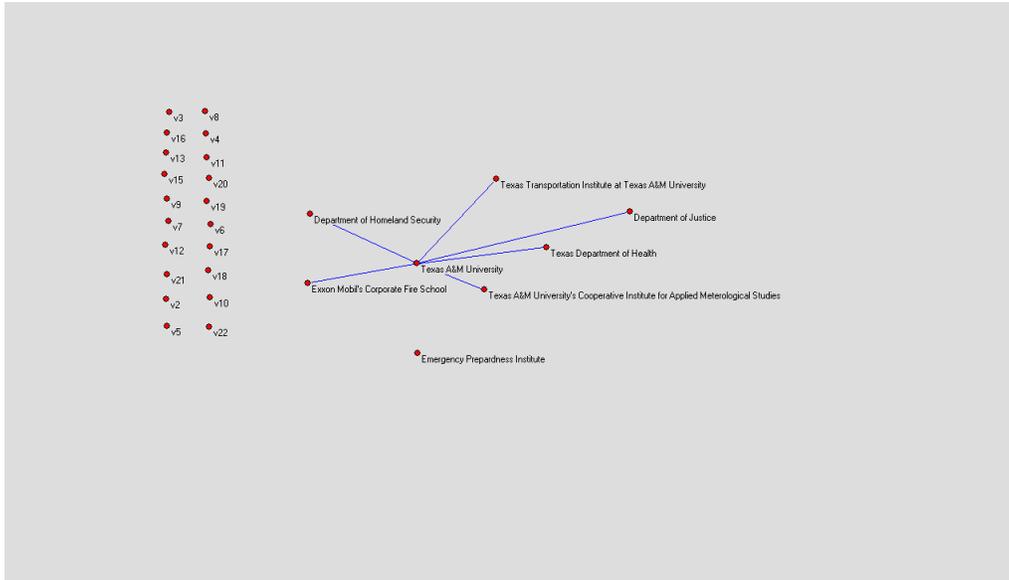

Figure 3: Brazos County Network 2002

9

Figure 4: Brazos County Network 2003

sentatives (albeit different actual organizations) of law enforcement, public health, fire protection, emergency management, transportation, and meteorology. The number of lapsed participants is adding up and exceeds the number of current participants.

The network in 2004 continues to be quite small and the scope of organization shrinks. With the university again at the center, now the network only includes emergency management, transportation, and meteorology organizations. There is less representation by public health, law enforcement and fire protection organizations. This limited network is an interesting baseline before what will be an incredibly active year.

3.2   Brazos County 2005

2005 represents an important year for studying the dynamics of networks. With the two major hurricanes (Katrina and Rita) both producing significant Gulf Coast evacuations that affected the studied community, this year served as the first of the recent tests of the evacuation hosting network in Brazos County. For the most part, scholarship and practitioner guidance on evacuation planning had focused on the process of getting people out of
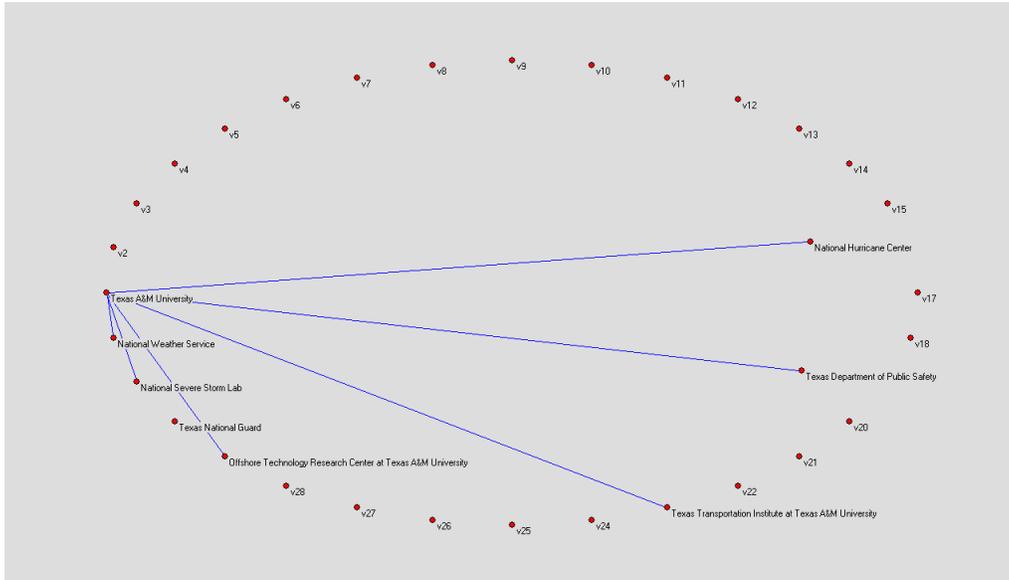
10

Figure 5: Brazos County Network 2004

harms way (cf. Perry & Greene 1981). For example, the use of counter-flow lanes were part of what was widely considered a successful process of getting the residents of New Orleans who had access to personal automobiles and chose to evacuate out of the city before landfall(the evacuation of people without access to personal transformation or who did not want to evacuate was another matter) (Litman 2006). Without a great deal of guidance on how to host evacuees, many organizations had to make up their own rules and processes as they went along. As a result, many organizations reached out for assistance and guidance from other organizations. The result is a larger and more diverse network.

All of the actors who were mentioned in the network in 2005 are named though many of them are not connected to any other organizations. This does provide some indication that connections are not trivial. Even with the increased number of actors, the university is still the most central actor - though of a disconnected network. Many of the policy areas that had appeared in the network in previous year, many of whose representatives had lapsed from membership, reappear in the network in this year. For instance, public health organizations reappear. There are also organizations that represent new sectors and policy areas. Housing agencies appear; as do private
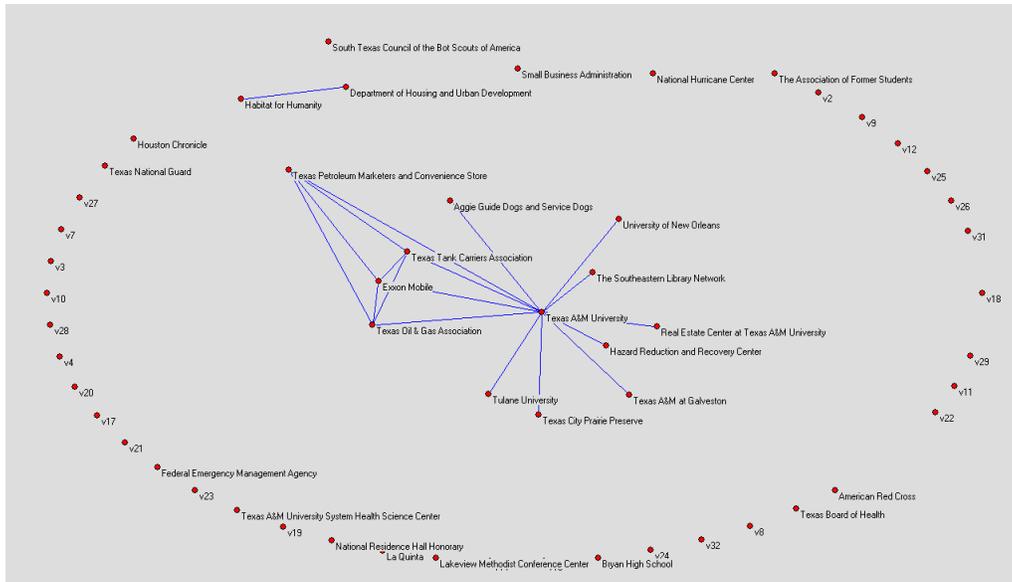
11

Figure 6: Brazos County Network 2005

sector organizations (and their representatives) that provided services during
the evacuation including La Quinta and the Small Business Administration.

Predictably, 2005 included both the largest and most diverse network
yet. The extraordinary demands placed on the evacuation hosting network
brought in a wide variety of actors. This raised an interesting question for
those in emergency management organizations and other long time members
of the network, how long would the actors stay?

3.3 Brazos County 2006-2007

The Brazos County network in 2006 and 2007 represents a period of recovery
and re-evaluation. While Brazos County was not directly affected by the
storms of 2005, the potential for such massive evacuation hosting activities
in the future forced members to identify effective practices and partnerships
while avoiding activities that were problematic. As one example, a member
of the evacuation hosting network complained about some of the sponta-
neously organized smaller hosting sites. Some sites never registered with
the Red Cross or any local emergency management organization. The well-
intentioned sites simply advertised directly on the road side and took in
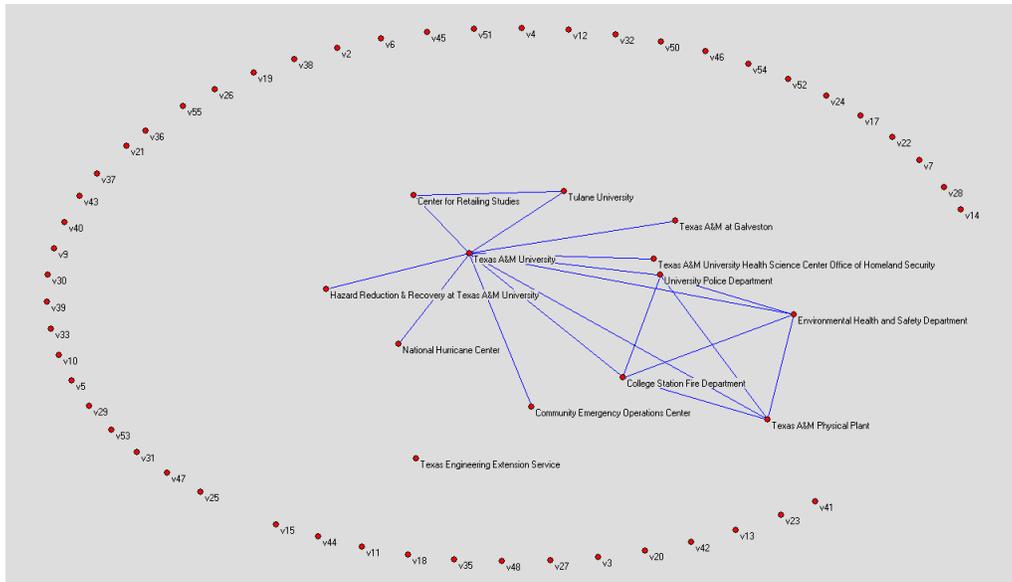
12

Figure 7: Brazos County Network 2006

evacuees. When the evacuees needed to stay longer than a couple of days, the spontaneous sites were ill-prepared to care for the evacuees. As a result, care for the evacuees dwindled and requests for assistance began to burden the formal sites (where the addition of the evacuees would not have been a problem if they have simply started at one of the recognized hosting sites) (Interviewee 2009).

Figure 7 shows a dramatic retraction of the size of the evacuation network following the 2005 hurricane season. Many of the organizations present in most pre-2005 years are still present including the central node of the university. Representatives of fire, environment, and public health are still present. The community EOC is also present representing local emergency management while state and federal officials are absent. The ring of unnamed nodes dramatically illustrates the number of actors who have been present in the network previously but who have exited the network for 2006.

Figure 8 represents the network in 2007. The network continues to shrink with only a few players remaining. Some organizations pop up (like the returning NOAA); some anomalously (like ATMOS energy). Most of the players represent university units (the university itself, the Hazards Center, the Homeland Security Center, and the TEES unit with strong ties to the
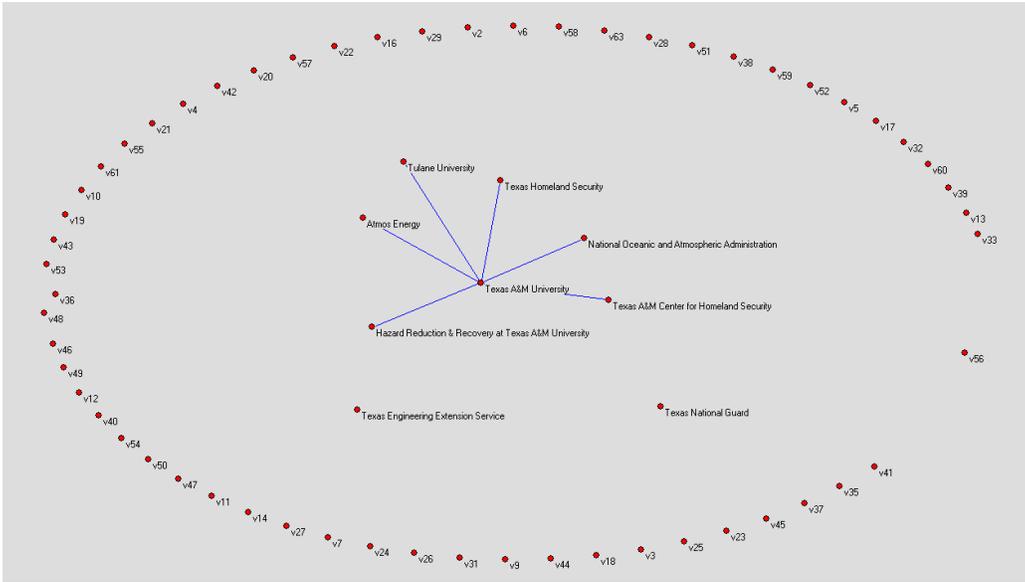
13

Figure 8: Brazos County Network 2007

university). The Texas National Guard and Office of Homeland Security (a unit of the previously involved Department of Public Safety) indicate some state participation in the network.

3.4   Brazos County 2008-2009

The Fall of 2008 presented a test of what had been learned following the 2005 hurricane season. There were two significant evacuations of communities along the Western Gulf Coast - associated with Hurricanes Gustav and Ike. While neither of these hurricanes produced the damage of Hurricane Katrina, the evacuation response and the demand for hosting was vigorous. Figure 9 illustrates the network for this activated hurricane evacuation network. Despite the dwindling participation in the network from 2006 through 2007, participation in 2008 expands beyond 2005 levels in sheer number as well as diversity. Representatives of emergency management, public health, and university units are present as always (and the university remain the central figure). The public health network is particularly robust. Despite the university being the central network actor, there is a new core that includes a number of emergency management and public health organizations
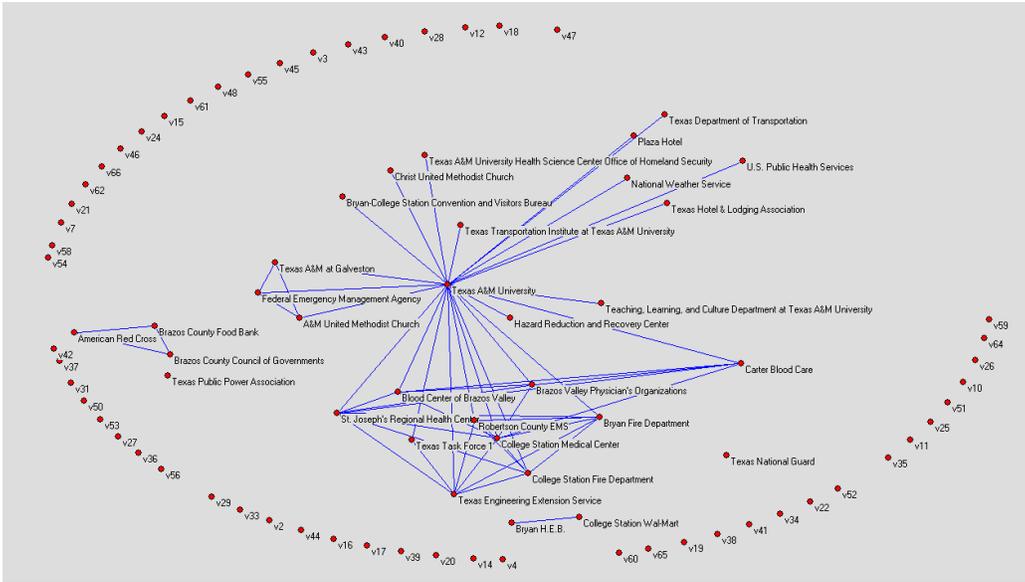
Figure 9: Brazos County Network 2008

(appearing just below the university in Figure 9). We also see a reemergence of welfare organizations (a food bank) and some actors representing private hosting facilities (hotels).

The final figure (Figure 10) shows another collapse of participation in the year following a major activation. While the hurricanes mobilize a large number of actors, those actors fade back out of the network during periods without activation. The data for this year are complicated by a local evacuation event in the summer of 2009. A chemical release forced an evacuation of one part of the county - resulting in hosting activation in other parts of the county. The company that experienced the chemical release (the El Dorado Chemical Company) appears for that reason. Local emergency management and fire officials also remain in the network - in part in reference to this local evacuation event. The university retains its central role.

4 Conclusion

This work is preliminary, so I am hesitant to infer much from the networks reported above. In this conclusion, I will discuss some candidate lessons from these data followed by discussions of the significant limitations of the data
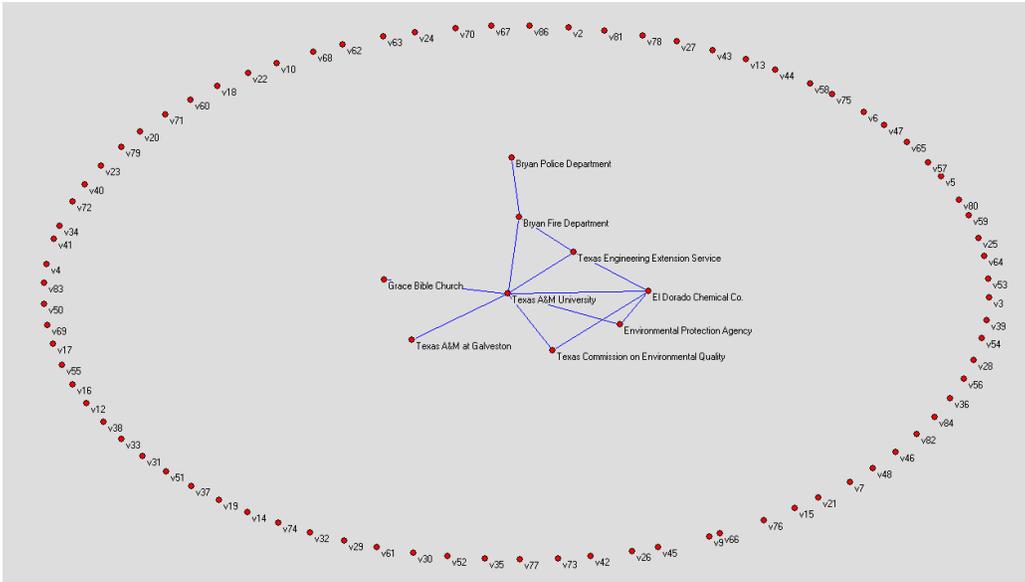
15

Figure 10: Brazos County Network 2009

and potential extensions of the study.

4.1   Preliminary Lessons

There are two preliminary inferences from the evolution of the Brazos County network. First, the central actors across all years was the large, nationally prominent university within the community. While a second clique of actors emerged in the 2008 evacuation network, the university is the hub of most of the media reported connections. Second, the network of actors is extremely fluid. The number of lapsed actors accumulates quickly throughout the time period. Even when aggregating up to policy sector representation (public health organizations, transportation organizations, etc.), there is considerable fluidity within the network with sectoral representatives entering and leaving the network. The network mobilized a large number of organizations representing sectors - but the network collapsed back to a small number of participants between large events.

4.2 Data Limitations

The primary lessons of the paper should be read with a significant degree of skepticism. There is a significant limitation of the data that may be playing a central role in defining the dynamics of the reported networks - independent of actual collaborative behaviors in the evacuation hosting network. These data involve media reports of evacuation hosting activity. The data are only as reliable as the initial media reports. Factors that influence media attention will affect the data generation process. This may explain a great deal of the centralization of the university. Texas A&M University is the largest and most prominent organization in the community by general measures of media attention. It could be this general salience serves as an attractor of evacuation network media attention to such a degree that it exaggerates the university's actual role in evacuation hosting activities. If media reports reflect factors independent of actual evacuation activity, the resulting networks will be biased. Based on interviews within the community, this is a significant problem in that the media reported networks do not reflect the image of the network from the perspective of interview respondents interview. The biases inherent in media reports may also serve to exaggerate the changes in network size. When evacuation hosting is salient, the media is more likely to cover it. The greater predisposition towards coverage may lead to both greater diversity of coverage and an increase in the number of covered actors. The fluidity in terms of size and diversity, then, may be spuriously related (or at least exaggerate by) the predisposition to cover evacuation organizations during large events.

It may also be the case that the specific community studied here may not be representative of all communities. Brazos County is a distinctive community in a number of ways: its geographic proximity to Houston (within this sample both a significant evacuating population and one of the largest hosting communities), its presence within a specific state evacuation planning context, its dominance by a large university, etc. Given the characteristics of community, one should hesitate to generalize from this single case study.

4.3 Potential Extensions

In the presence of these significant limitations on the media reported network data, a key extension will be to apply the method to other communities and to collect data using other strategies. The research project that started

with the Brazos County network will continue to collect comparable data for five other, similarly-sized communities. The diversity of cases should provide some protection from over-generalization. Only phenomena within the networks that are general across communities (from various states, etc.) will be a sound basis for generalization. I will have to chart carefully the consistent signals present within each of the networks - and discount the signals that are present in only one or a few of the networks.

It will also be important to compare media generated data to data collected through other strategies. I plan to conduct parallel network studies using interview data, survey data, formal plan data, and situation report/after action report data. These other strategies provide potentially disconfirming tests of the various hypotheses related to evacuation hosting networks. Each of these other strategies have their own limitations. The interview data, for example, may be likely to exaggerate the role of the interviewees. The formal plans are not updated frequently enough to capture changes on an annual basis. In Brazos County, there will have been three operative emergency plans over this decade (one of which was still in the approval stage in late 2009). This data will not be as useful in tracking changes in participation over time. With limitations like these, the combination of inferences from varying data sources will be a difficult process requiring great care.

References

Comfort, L.K. 1994. "Self-organization in Complex Systems." *Journal of Public Administration Research and Theory* 4(3):393–410.

Comfort, L.K. 2007. "Crisis Management in Hindsight: Cognition, Communication, Coordination, and Control." *Public Administration Review* 67(s1):189–197.

Comfort, Louise K. 2006. ""The Dynamics of Policy Learning: Catastrophic Events in Real Time." Presented at the 2006 Annual Meeting of the American Political Science Association.".

Heclo, Hugh. 1978. "Issue Networks and the Executive Establishment". In *The New American Political Establishment*, ed. Anthony King. American Enterprise Institute pp. 87–124.

Interviewee. 2009. Confidential Personal Interviews.

Kiefer, J.J. & R.S. Montjoy. 2006. "Incrementalism Before the Storm: Network Performance for the Evacuation of New Orleans." *Public Administration Review* 66:122.

Litman, Todd. 2006. "Lessons from Katrina and Rita: What Major Disasters Can Teach Transportation Planners." *Journal of Transportation Planning* 132:11–18.

McCool, D. 1998. "The Subsystem Family of Concepts: a Critique and a Proposal." *Political Research Quarterly* 51(2):551.

O'Toole Jr, L.J. 1997. "Treating Networks Seriously: Practical and Research-Based Agendas in Public Administration." *Public Administration Review* 57(1).

Perry, RW, MK Lindell & MR Greene. 1981. "Evacuation experiences and the evacuation planning process". In *Evacuation Planning in Emergency Management*, ed. MK Lindell Perry RW & MR Greene. Lexington Books pp. 121–150.

Redford, E.S. 1969. *Democracy in the administrative state.* Oxford University Press, USA.

Robinson, S.E., B. Berrett & K. Stone. 2006. "The Development of Collaboration of Response to Hurricane Katrina in the Dallas Area." *Public Works Management & Policy* 10(4):315.

Sabatier, P.A. & H.C. Jenkins-Smith. 1993. *Policy Change and Learning: An Advocacy Coalition Approach.* Westview Pr.

Sabatier, Paul. 1993. "Policy Change Over a Decade or More". In *Policy Change and Learning: An Advocacy Coalition Approach*, ed. Paul Sabatier & Hank Jenkins-Smith. Westview Press pp. 13–40.

Waugh, W.L. & G. Streib. 2006. "Collaboration and leadership for effective emergency management." *Public Administration Review* 66(s1):131–140.