

Extension as a Multilevel Bridging Organization: Supporting Networked Environmental Governance

Abstract

Governmental and nongovernmental actors at different spatial and jurisdictional levels have information that can benefit natural resources management; however, barriers in communication and organizational culture often prevent information sharing and joint endeavors. Bridging entities, such as task forces or working groups, bring together potential stakeholders to pool expertise and stimulate shared learning. Using a network survey, interview data, and meeting minutes, we constructed a case study of task forces convened to stimulate management of the emerald ash borer, an invasive wood-boring beetle. We found that coordinated action among university and county Extension catalyzed bridging through visionary program design and network positioning.

Keywords: [environmental governance](#), [bridging](#), [invasive species](#), [natural resources](#), [network analysis](#)

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Introduction

Individuals and organizations working at different spatial and jurisdictional levels have access to different types of knowledge that can help communities respond to natural resources issues such as invasive species, zoonotic diseases, and emerging climate change impacts. A wide range of community members, such as gardeners, bird watchers, hunters, and park and cemetery managers, observe patterns and changes in ecosystem dynamics in areas they visit or manage (Colding, Lundberg, & Folke, 2006). Municipal and county governments retain institutional knowledge about the green infrastructures they maintain (Ernstson, Barthel, Andersson, & Borgström, 2010). State and federal governments provide regulatory information and together with university faculty are often a source of specialized knowledge. Regional and national private sector actors provide insights on technical innovations that support environmental management. However, institutional barriers such as sectoral fragmentation and differing operating paradigms (i.e., the regulatory roles of bureaucracies vs. market orientation in private firms) can hinder the movement of information (Lebel, Manuta, & Garden, 2011; Pahl-Wostl, 2009).

Some regions and cities have made strides toward drawing on networks of stakeholders to manage their natural resources (Crona & Parker, 2012; Ernstson et al., 2010; Olsson, Folke, Galaz, Hahn, & Schultz,

2007). However, collaborative networks are resource intensive to sustain and can collapse with staff turnover when connections are tied to individuals rather than organizations. Purposeful strategic and long-term bridging is needed. Cooperative Extension systems across the United States have a history of convening groups for collective problem solving. Extension workers create and execute programs to meet the current and changing needs of the world with respect to natural resources and the environment. They do so with a dual purpose: "[to] foster an understanding of the role of natural resources in the quality of both urban and rural life, and [to] encourage affected parties to cooperate in making assessments and developing public policy" (Rasmussen, 1989, p. 205).

In this article, we highlight how Extension staff at universities and in counties are functioning as bridging organizations by systematically connecting people across spatial and jurisdictional levels and sectors to integrate different types of knowledge, and we explore the associated implications for adaptability in environmental governance. First, we describe concepts related to bridging and organizations that facilitate bridging. We then present a case study from the Extension system in New York and its response to an invasive pest. Finally, we discuss aspects of bridging leadership that emerged from the case study and offer suggestions and further areas of inquiry on how Extension personnel can pursue systematic bridging.

Bridging and Bridging Organizations

Bridging across levels of government and sectors of society can enable coordinated action on environmental problems such as water scarcity (Crona & Parker, 2012), poor air quality (Stubbs & Lemon, 2001), urban ecosystem degradation (Ernstson et al., 2010), and human-wildlife conflicts (Raik, Lauber, Decker, & Brown, 2005; Schusler, Decker, & Pfeffer, 2003). Often task forces or working groups are formed to bring together government personnel, private citizens, businesspeople, and researchers. Leadership and expertise are needed so that such groups can develop an accurate vision of the issue at hand, pool their knowledge, and identify beneficial actions to take (Agranoff & McGuire, 2001; Yaffee, Wondolleck, & Lippman, 1997).

Arizona State University's Decision Center for a Desert City (DCDC) is a strategic bridging organization operating in the highly contentious political environment of water scarcity in the southwestern United States. Although DCDC has just a few employees of its own, it has drawn more than 100 participants from traditional university departments, city and state water agencies, and for-profit water management companies into different bridging platforms to address specific issues for water governance, resulting in a measurable increase in policy makers' using research in their decision making (Crona & Parker, 2011, 2012). The Ecomuseum Kristianstads Vattenrike, another bridging organization in an ecologically important region in Sweden, manages three types of bridging networks: consultancy groups to shape overarching economic and environmental goals for the region; theme groups addressing specific resource types, such as flooded meadows (Olsson et al., 2007); and "adhocracy" groups that emerge in response to a specific problem (Hahn, Olsson, Folke, & Johansson, 2006).

Extension systems have acted as bridging organizations in many different contexts: to analyze and negotiate groundwater usage in a depleted aquifer system (Cash, 2001), to bridge farmers and researchers for knowledge innovation around small-scale production agriculture in developing countries (Chowdhury, Hambly Odame, & Leeuwis, 2014; Klerkx, Schut, Leeuwis, & Kilelu, 2012; Rivera & Sulaiman, 2009), and to find and implement solutions to decrease soil erosion in steep, heavily cultivated watersheds affected by increasing extreme precipitation events (Vignola, McDaniels, & Scholz, 2013).

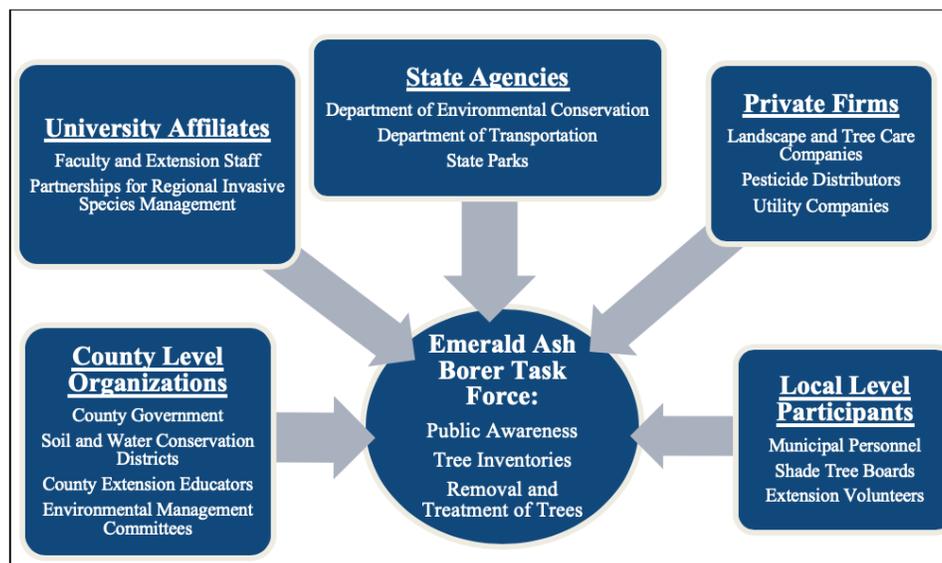
Emerald Ash Borer and Community Task Forces

The case study described in this article was set in New York State where the emerald ash borer (EAB) (*Agrilus planipennis*) is having a large impact on rural and urban forests. The EAB is an invasive beetle, first identified in the United States in Michigan in 2002, that causes widespread death of ash trees (*Fraxinus*), with the majority of tree deaths occurring in just a few years as populations of EAB peak in an area (Herms & McCullough, 2014). Ecologically, EAB results in widespread gaps in the canopy, accompanied by cascading effects on forest composition and ecosystem processes (Klooster et al., 2014). Local governments and homeowners are heavily affected by EAB (Aukema et al., 2011). In aggregate, they pay large amounts of money to chemically treat and/or remove and replace high-value urban and residential ash trees posing hazards for safety and property (Kovacs et al., 2010).

When EAB was discovered in New York in 2009, a university Extension specialist in forest entomology in the Department of Natural Resources at Cornell University began offering public presentations across the state to raise awareness of EAB and the need for proactive management. However, few municipalities or counties initiated management planning. Even in jurisdictions where managers understood the magnitude of the problem, they had difficulty integrating general information on EAB into specific management plans. To overcome these challenges, the Extension specialist initiated a program of EAB task forces as bridging platforms with the rationale that by working together, stakeholders (listed in Figure 1) could help their communities prepare for EAB on the municipal and county level and also through outreach to homeowners.

Figure 1.

Participants in Local Emerald Ash Borer Task Forces in New York



We collected data for the study reported here as part of a larger project (Nourani, Krasny, & Decker, 2018). We conducted a network survey of task force members via Qualtrics ($N = 67$, 63% response rate overall) and in-depth interviews ($N = 12$) (see appendix for survey instrument and interview guide) in 2014 and 2015 in three counties where task forces had been meeting regularly for more than 2 years. We selected interviewees who had been engaged with their respective task forces from the beginning in order to collect information about the histories of the task forces and feedback on the bridging processes they used. We transcribed the

interviews and coded the data to identify emergent and frequently mentioned themes. We also examined information compiled from meeting minutes and participant observation of task force meetings for the three aforementioned task forces and one additional task force between 2012 and 2016. The names of the counties, task forces, and task force members have been withheld at the request of study participants (IRB Protocol #1303003715).

Establishing a Platform for Bridging

Beginning in 2011, the previously identified university Extension specialist began discussing the concept of EAB task forces with people concerned about EAB from state, county, and municipal agencies; private firms; and university affiliates. Many of these individuals had a knowledge base about EAB from participating in relevant trainings. These initial members used their own professional networks to invite other stakeholders (from the stakeholder groups shown in Figure 1) to join EAB task forces in their respective counties or multicounty areas. Four EAB task forces formed and met monthly or quarterly from 2012 to 2015, engaging approximately 200 people directly and many more through educational events initiated by the task forces. A county Extension staff member helped initiate each EAB task force. However, most of the task force members were not affiliated with Extension, and in each task force members from state or county agencies engaged in leadership roles.

As the task forces became established, county Extension staff began to play increasingly important roles. In two of the task forces, a county Extension staff member immediately became the contact person for the task force, announced the meetings, set the agenda, and helped the task force develop mission statements and shared goals. In two other task forces, a manager from the county took on this role. The mission statement from one EAB task force is as follows:

The [task force] is a volunteer organization of forestry resource professionals, scientists, natural resources managers, local officials and private citizens assembled to facilitate a science-based response to the economic, ecological and public safety impacts of EAB within the forests and communities of the [region name] region of New York.

To enable participants to benefit from one another's knowledge, county Extension staff and other task force leaders put into use "roundtable" approaches, soliciting participation from each task force member. Where this was done routinely and with attention paid to timekeeping, task force members enthusiastically reported benefits from the information they gained.

At times, county Extension staff had to manage potential sources of conflict. For example, private tree-care firms and pesticide distributors stood to benefit from the task forces by gaining contact with new potential clients. County Extension facilitators ensured that the task forces were seen as unbiased by emphasizing research-based management recommendations at task force events and not recommending any firm directly. When EAB was discovered in a county with an active EAB task force, tension arose surrounding state agency protocols and the interests of local stakeholders regarding how and when to make a public announcement about the discovery. The county Extension facilitator helped the opposing groups come to a compromise: delaying the announcement until the state could verify the infestation but allowing the county and the task force to make the announcement so that it reached the broadest networks within the county.

To maintain clarity about the management problem and options in light of the growing size and intensity of

EAB infestations, the university Extension specialist visited all EAB task forces repeatedly. The Extension specialist and his assistant, an author on this manuscript, also organized "task force exchanges," where facilitators of different task forces around the state were invited to meetings to engage in an exchange about experiences, strategies, and challenges. Tools that were developed in one task force, such as an EAB community survey, were shared and used by other task forces, accelerating the progress in addressing the EAB management issue.

Pooling Knowledge and Initiating Action

Task force members reported new sightings of dead and dying ash trees at the task force meetings and created maps of the spreading infestations. One task force went further by organizing a systematic collaborative monitoring program. In addition, each of the task forces organized public presentations and workshops to educate municipal tree crews and homeowners about EAB.

Municipal and county managers who attended the workshops were invited to participate in the task force meetings for continued decision-making support. Some did, and as they created management plans and took actions to remove and treat ash trees, they shared their experiences, a practice that was very valuable to other local governments. A member of one town tree crew stated, "We have enacted many of the ideas and plans set forth by the E.A.B. task force. We have learned how to detect, identify, and verify E.A.B. We will continue to properly remove trees that have succumbed to the E.A.B." And a county manager dealing with many thousands of ash trees on county property recounted, "To sum up what I feel our task force brought, it brought networking of people and resources and it also helped bring solutions to the problem. . . . Extension is always good about making sure there's a lot of cross-representation." Of course, there were differences among the task forces in their ability to stimulate management action, with some rural towns and counties encountering insurmountable financial barriers to management (for more detailed results, see Nourani et al., 2018).

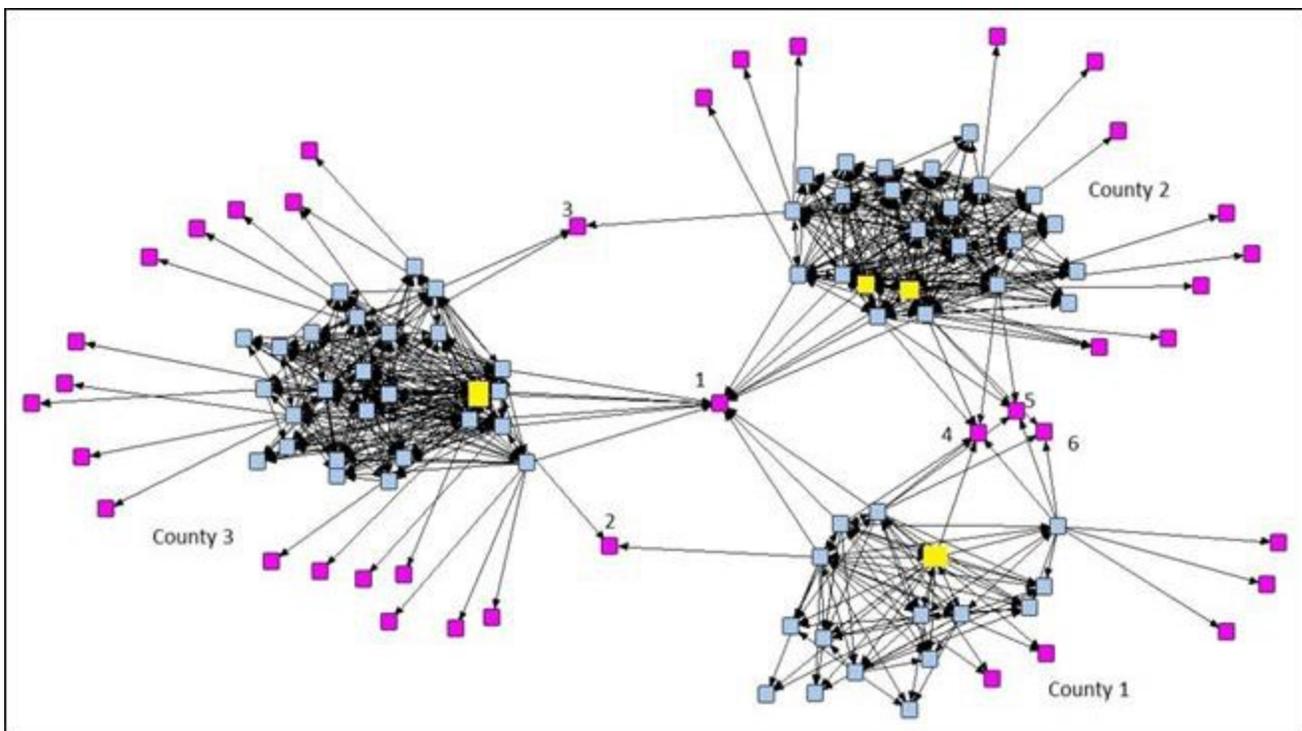
Interviewees, including Extension facilitators, also commented on how connections they made through the EAB task forces had assisted them in other aspects of their work. For example, one said, "As an [Extension] person, I think it's been very valuable to work with the task force because 5 years ago I did not have as strong a relationship as I do now with the village of [name], or the town of [name], so, it's been an opportunity to provide Extension resources to them, [to support] science-based decision making."

Mapping the Network

We used social network analysis, a promising method for mapping Extension networks (Bartholomay, Chazdon, Marczak, & Walker, 2011; Springer & de Steiguer, 2011), to visualize bridging in three of the EAB task forces. Task force members were surveyed about their communication and collaboration (a) with each task force member prior to the task force formation (retrospectively), (b) with each task force member at the time of the survey, and (c) with individuals and organizations who did not participate in the task force from whom they received information and advice on EAB (see the appendix for survey questions). Network density increased 13% in County 1, 21% in County 2, and 20% in County 3. These values indicate that in each task force, some members were already in communication with one another and other individuals who had not previously worked together began doing so. The values do not reflect the frequency of communication, which also increased. By creating a map of connections within and between EAB task forces (Figure 2), we observed

the central role of university Extension staff (Nodes 1 and 2 in the figure) in bridging diverse stakeholders at a state level and county Extension staff (yellow nodes in the figure) in bridging stakeholders within their counties or subregions. Other notable entities providing information to EAB task force members included representatives of large pesticide distribution firms actively marketing chemical treatments for EAB to municipal and county agencies (Nodes 3, 4, and 5 in the figure) and a federal agency involved with EAB education (Node 6 in the figure). National and regional firms with technical solutions to offer may act as important nodes in a network during a disturbance, offering information on the issue at hand, but the information they offer may favor management options that involve use of their products. The presence of an Extension-led bridging platform helped ensure that decision makers had access to unbiased, research-based information.

Figure 2.
Network Map of Three Task Forces



Note: Blue nodes are task force members, and pink nodes are individuals or organizations they go to outside the task force for support, advice, and information on EAB. Yellow nodes are county Extension facilitators. Network map was produced in UCINET (Borgatti, Everett, & Freeman, 2002).

Discussion and Recommendations

Silos of information among bureaucratic, private, and civil society actors often characterize multilevel governance systems and hinder effective governance. Creating the right links at the right time is thought to be crucial to enabling governments to respond to disturbances (Olsson et al., 2007). Drawing from the case presented herein, we highlight forms of bridging leadership that university and county Extension personnel provided and discuss implications for Extension systems and future areas for outreach and research.

Expertise on EAB enabled the university Extension specialist to identify stakeholder groups, both those that would need support for decision making and those that would have information to contribute. County Extension staff and other leaders within the task forces were able to tap into networks within their counties to mobilize a variety of stakeholders and facilitated task force meetings to engage in knowledge pooling and joint action. This finding indicates that by organizing bridging initiatives, Extension can assist government agencies at different levels to ensure that they not only benefit from science-based decision making but also gain the advantages of a networked style of environmental governance (Cash, 2001; Ernstson et al., 2010). Bridging at a county or local level may be needed to assist local decision makers in adapting to climate change (Bidwell, Dietz, & Scavia, 2013). In fact, our ability to even recognize gradual changes in ecosystem dynamics may depend on engaging diverse actors at different spatial levels (Ernstson et al., 2010). The breadth of expertise and networks to which university and county Extension staff are connected (Bartholomay et al., 2011) and the unique position of Extension outside of market and government institutions (Arnold, 2000) provide Extension personnel with access to varied entities and authority to convene groups for bridging on many issues.

The bridging we described was focused on one issue, which is a limitation of our case study. A bridging organization systematically brings people together over many years to engage in joint research, policy making, and action, tracking networks and using facilitation techniques that build trust and common purpose. Extension systems often act as bridging organizations, but not every interaction is bridging. Other approaches, such as public education and the dissemination of information, also are central to Extension work. Further inquiry is needed to determine how a county Extension office can track and build networks at the county and local levels to contribute to environmental governance. In addition, information is needed regarding how university departments track and capitalize on the networks university Extension specialists develop. Moving forward, natural resources Extension staff at the university level should identify issues where bridging can be productive and work with county Extension staff to design bridging interventions by identifying stakeholder groups and creating platforms for collaboration. County Extension staff may benefit from taking two steps: (a) mapping the networks they are already part of and (b) analyzing long-term planning issues and shorter term disturbances in their counties to determine where university Extension expertise may be brought to bear and where creating bridges among stakeholder groups may be beneficial.

Conclusion

Developing networks that cross levels of government and sectors of society represents a promising paradigm in environmental governance, but it requires strategic bridging to develop and sustain relationships among organizations with divergent interests. The history of Extension systems as community organizers and the connections to networks at multiple levels position university Extension specialists and county Extension offices to act in bridging capacities. Taking on this role is timely as communities face environmental issues with causes, effects, and solutions at multiple levels. The result would be a powerful network for contributing to environmental governance spanning levels from nation to neighborhood.

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Appendix

Survey Instruments and Interview Guide

The survey was administered online using Qualtrics. The version below represents all questions asked but the formatting has been simplified.

Survey

1. What is your name?
2. What agency or organization are you affiliated with?
3. What is your position in the agency or organization?
4. The following questions will help us to understand the collaboration between government and the private sector and among levels of government that occurred around the management of EAB. We are interested in how existing professional relationships and networks have supported the work of the Emerald Ash Borer task forces, and if new communication and collaboration has been established. For each person on the list below, please indicate how often you had contact (in person, over the phone or via email) with him or her. Please select an answer: Several times a week, several times a month, several times a year, once a year, never, not applicable (that's me)
 - a. How frequently were you in contact with this person below PRIOR TO becoming involved with the Emerald Ash Borer task force?
 - b. How frequently are you in contact with this person in the LAST YEAR
 - c. Please think about organizations or individuals not listed above that you go to for information, advice, support, or help on EAB or ash management. Enter the name of the individual or organization and how frequently you have been in contact (in person, over the phone or via email) for up to 10 individuals or organizations using the following scale: several times a week, several times a month, several times a year, once a year.
5. We have provided categories of activities common in areas dealing with the emerald ash borer. Please consider each category and in the space below list or describe activities that you have participated in.
 - a. Education and outreach activities (ex. giving a presentation on EAB, manning a table at a public event, preparing a pamphlet or other educational material)
 - b. Activities related to monitoring (ex. examination of ash trees for signs and symptoms of EAB, delimitation of infested areas)
 - c. Activities related to management and planning (e.g., management planing, ash tree inventories, tree removal or treatment)

6. People take part in the EAB task forces for different reasons. How important are each of the following reasons to you? Check a box for each statement from "not at all important" to "very important."
- a. To find out about current EAB population levels and new pockets of infestation in my area.
 - b. To have access to expert information about EAB and management options for ash trees.
 - c. To gain information for the management of ash trees that my agency is responsible for.
 - d. To contribute expertise I have on EAB or ash management options.
 - e. To contribute to public education and outreach about EAB.
 - f. To contribute information I have about dead and declining ash trees in the area.
 - g. To network with other individuals and organizations.
 - h. Because of a professional obligation.
 - i. For what other reasons do you participate in the EAB task force?
7. You responded that the EAB task forces have been important to you for gaining information on ash management and EAB. Please describe actions your agency has taken to deal with ash trees and EAB or actions you plan to take.
8. In this section of the questionnaire we are interested in understanding how the emerald ash borer task force has influenced your work. Please think about your participation in EAB task force meetings, at educational events put on by the EAB task force or in other interactions you feel are related to your involvement with the EAB task force. What have you come away with from participating? For each statement below, please indicate the extent to which you agree or disagree: (Check the appropriate box on the scale below from strongly disagree to strongly agree)
- a. My understanding of the ecological impacts of emerald ash borer has increased.
 - b. My understanding of the social and economic impacts of EAB have increased.
 - c. My understanding of the options and timeline for management of ash trees has increased.
 - d. A majority of my current knowledge about EAB comes from my involvement with the EAB task force process.
 - e. The EAB task force has helped me understand the perspective of others participating in the task force.
 - f. The EAB task force has become more important to my work over time.

- g. My experience with the EAB task force process has led me to participate in new or surprising projects.
- h. My views are similar to those of others involved in the EAB task force.
- i. Over time, the process has changed my view on which goals should steer the management ash trees in the area.
- j. My involvement has enhanced my cooperation with other individuals and groups/organizations that participate in the EAB task force.
- k. My involvement enhanced my cooperation with other individuals and groups/organizations that don't directly participate in the EAB task force.
- l. My involvement has enhanced my communication with other individuals and groups/organizations within the EAB task force.
- m. My involvement has enhanced my communication with other individuals and groups/organizations outside the EAB task force.
- n. I have collaborated with individuals I have met through the EAB task force on other projects.

Interview Guide

1. How did you become involved with the EAB task force?
2. This kind of task force can have a variety of products and outcomes. I will be going through a list of possible outcomes from the EAB task force. I would appreciate your input on each and then at the end you can add in any outcomes or impacts I have missed.
3. First I'd like to ask for information on the impacts of the EAB task force on ash management. Interviewer provides a list of municipalities and request information on:
 - a. Ash trees REMOVED by EACH MUNICIPALITY
 - b. Ash trees TREATED with pesticides by EACH MUNICIPALITY
 - c. Ash trees REMOVED by COUNTY
 - d. Ash trees TREATED by COUNTY
- e. You said the following actions were taken: xx, yy, zzz, now I would like to go through each one and ask if you think the task force had an influence and if the TF did, how the TF might have influenced the outcomes.
4. In addition to the tangible management plans and actions that you have mentioned, what other outcomes

5. Were there new professional relationships or partnerships among individuals or organizations that developed through the task forces?
 - a. Educational and outreach for homeowners?
 - b. Undertaking collective actions to resolve problems?
 - c. Increased connections among participants?
 - d. New or modification of institutional arrangements (formal and or/informal) – policies, strategies, organization etc
 - e. New cooperative undertakings?
 - f. You said the happened: xx, yy, zzz, now I would like to go through each one and ask how it came about. What habits or practices of the group of people in the task force helped or hindered this outcome?
6. Of the outcomes you have mentioned, where there some you expected to see? Were any unexpected?
7. Are there any results that you see as extending beyond EAB to other issues or projects?
8. Did any problems occur? Were any conflicts or controversies accidentally created?

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