

MANAGING LARGE WOODY DEBRIS IN SULLIVAN COUNTY, NEW YORK

BY

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CAPSTONE PROJECT

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Abstract

Large Woody Debris (LWD) is the classification given when large amounts of wood (trees, branches, sticks, etc.) fall into a waterway. Depending on its placement in a stream, LWD can potentially cause flooding, erosion or damage private property and/or public infrastructure. LWD also plays an important role in stream ecology by providing nutrients to the stream ecosystem and habitat to fish and other aquatic organisms. In Sullivan County, NY, the Sullivan County Soil and Water Conservation District (SCSWCD) is one of a number of agencies responsible for managing LWD and is challenged by how to strike a balance between protecting public infrastructure while also protecting the environment. This research set out to answer how the SCSWCD could develop a clear policy direction for LWD management. This research project looked at the literature related to collaboration and conflict to help focus methods. A focus group consisting of a diverse group of stakeholders then helped the researcher thematically analyze the data to determine findings. There were four distinct findings. These findings were: Current LWD management practices are reactive rather than proactive in nature; LWD has both positive and negative characteristics; the permitting process to do work in a stream is difficult and time consuming; and many people are not aware of LWD issues. Finally, the recommendations were based upon these findings. The recommendations included: Developing a proactive LWD management policy; encouraging the removal of “bad” LWD and the placement of “good” LWD; streamlining the permitting process; and holding outreach sessions to educate the public about LWD issues.

For Al and Amy

Al Vos

Teacher, Mentor, and Friend.

Without You I Don't Know Where I Would Be In This Life.

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Amy Bishop (née Forgacs)

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For Inspiring Me In My Undergraduate Endeavors And For Encouraging Me To

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Problem Statement

If a tree falls in the forest, and no one is around, does it make a sound? That rhetorical question has been pondered by philosophers for centuries. As charming and abstract as this metaphorical saying is, a similar (and quite serious) question is now being pondered by the staff of the Sullivan County Soil and Water Conservation District (SCSWCD). The question they are asking is what can be done about the problem of large woody debris (LWD), the modern version of the trees falling in the forest.

New York State Soil and Water Conservation Districts (the Sullivan County district is one of 58 in the state) are subdivisions of local government established under state law to carry out programs for the conservation, use and development of soil, water and related natural resources. Districts are resource management agencies, coordinating and implementing natural resource and environmental programs at the local level in cooperation with federal and state agencies.

Districts work alongside landowners, local governments, and others interested in addressing a broad range of natural resource concerns. The purpose of Soil and Water Conservation Districts is not only to conserve water and soil resources but also to reduce flooding, decrease pollution (particularly nonpoint source agricultural pollution), and promote sustainable agriculture through proper drainage and irrigation techniques. LWD affects the organization's mission by increasing the likelihood of flooding and stream bank erosion, which could result in property loss and decreased water quality.

LWD is exactly what it sounds like: branches, sticks, logs, tree trunks, etc., that have fallen into or across a stream. This happens naturally all the time, especially after large wind/rain storms or flooding events. Issues with LWD arise because, depending on the size and

orientation of the fallen debris, it can cause major problems with the stream and obstruct or alter the flow of the water. It can in some circumstances cause the shape of the stream channel to change course which could affect existing property and/or development along the stream bank. LWD can obstruct the flow of a stream increasing the risk or rate of erosion and scouring that occur within the stream bank and stream bed. LWD slows the flow of water through a bend in the stream, while accelerating flow in the constricted area downstream. In and around the village of Jeffersonville, New York, in Sullivan County, the problems of LWD are particularly evident. After the 2005 flood, large trees (many of which were 30 inches in diameter or more) came crashing down the stream during the peak of the flood, seriously damaging bridges, roadways and other public infrastructure. In one particular area, a large number of LWD became lodged together in a narrow part of the stream, causing a bottleneck that actually changed the course of the stream and resulted in tremendous property damage that is currently threatening the stability of a nearby county road (B. Brustman, personal communication, July 27, 2010).

What to do about LWD is a very contentious issue for those in the SCSWCD as well as in communities with stream frontage. Stream ecologists generally view large woody debris as a good thing. It provides habitat for aquatic wildlife, such as fish, and the decaying organic material adds nutrients to the water making for a healthier stream ecosystem. In contrast, most landowners typically view LWD as a hazard for their property because of the increased risk of flooding and erosion that it can cause (B. Taylor, personal communication, July 21, 2010). There has been increasing disunity about how to manage LWD in the SCSWCD. The older employees have been trained in a traditional approach, namely removing LWD as soon as it is discovered. The newer employers have been trained in a different, more ecologically sensitive approach, chiefly removing the LWD that could pose a hazard and leaving in the LWD that is

not posing a hazard. These conflicting approaches about how to best manage LWD present a number of organizational and inter-organizational challenges to the SCSWCD.

In New York State, the issue is complicated because the New York State Department of Environmental Conservation (DEC) has strict permitting guidelines for anyone who wants to do work in a stream, in particular if heavy equipment must be used, which is often needed in cases of LWD. On an even more practical level, if LWD falls within a section of a stream owned by a private landowner, most municipal governments cannot help that landowner because that help would use public resources to deal with a private individual's problem. Public authorities are caught in a difficult situation because of this. While it is technically the private landowner's problem, if LWD is situated in an area that might cause damage to public infrastructure, many public authorities feel that they need to do something about it before it causes damage. Towns have a 50 foot right-of-way on either side of a bridge or culvert to do work. This means that if LWD is located within 50 feet of public infrastructure, a municipality can go in and remove it even if the LWD is technically on private land. However, LWD does not always fall within that stated range. This is why most county and town public works departments do not have to be involved with LWD.

SCSWCD has a role to play in managing LWD. Its jurisdiction allows it to conduct work on private property. However, this does not solve the problem of managing LWD. While some landowners may want to have assistance removing LWD from their property, they may not be able to afford the expense. While the SCSWCD can offer technical assistance and some limited funding it almost always is not enough to cover the entire operation. For other landowners, while LWD may be present on their property, it may not be causing damage to their property; but it may be affecting their neighbors downstream. Where LWD is present, it typically accumulates

more branches, sticks, logs, etc. behind the initial obstruction. If these log jams were to break, not only could massive flooding occur, but they could also be sent hurtling downstream damaging not only downstream properties but also public infrastructure (bridges, culverts, etc.). Some landowners may not be able to afford remedying the problem before it causes this massive damage. Others simply do not care what happens downstream of them.

This state of affairs puts the leaders of the SCSWCD in a difficult situation. While they would like to assist with the proper management of LWD, as stated above, there are a number of obstacles that need to be overcome. The practical need of protecting private property and public infrastructure is undoubtedly important, but also equally imperative is the need to protect sensitive ecological habitat. As noted, LWD plays an important part in providing nutrients and habitat to stream ecosystems and the complete removal of it could seriously disrupt the natural order of these ecosystems. The health of these ecosystems has a direct impact on quite literally millions of people. Sullivan County has a significant stake in protecting its natural environment because of its dependence on ecotourism, in particular fly fishing tourism. Also, a significant part of Sullivan County's streams constitute part of the New York City Watershed which supplies clean, unfiltered drinking water to over nine million people. Keeping the stream in good ecological condition is vital in preserving the quality of the drinking water. Obviously, there is a need for the SCSWCD to develop a clear policy for the management of LWD.

Within the SCSWCD there are a variety of opinions about how to best handle LWD issues and what would be the best approach to take in creating a clearer policy. These differences of opinion can lead to conflict. Although the conflict is mostly congenial in nature, the differences do present a challenge to overcome. When nearly half of the employees view

LWD as being primarily hazardous, while the other half view it as being mostly beneficial, it is difficult to achieve a consensus on how to best move forward on creating a clear policy direction.

Research Question:

How can the Sullivan County Soil and Water Conservation District develop a clear policy direction for the management of large woody debris?

Conceptual Framework

The two conflicting views of managing LWD tell us that the ultimate obstacle to overcome is to build consensus on how to achieve a clear policy direction on managing LWD. To do this a useful approach would include examining the literature on the subject of negotiation, collaboration, and consensus building within organizations. Although there is a dearth of literature on the subject as it relates to LWD, we can examine the subject through a more general lens as it relates to similar areas of policy development.

Literature Review

There are a variety of routes to take when examining the literature of consensus making and group collaboration. This author will choose to examine the literature based on three principals: psychological approaches, collaboration, and using conflict productively. The reason these areas will be focused on relate to the nature of the problem. Psychological approaches will allow us to examine the issue in light of the mental factors that deal with collaboration and decision making within an organization. Collaboration, as its name suggests, will aid us in determining the best way to design a method of cooperation that everyone in the agency can

agree upon. Finally, the literature on using conflict productively will allow us help us determine the best course of action to take when negotiations concerning LWD policy take place.

Psychological Approaches

Research has been conducted that concludes that many people take public sector jobs out of a desire to serve their communities rather than merely to achieve personal aims. In fact, much of the research has demonstrated public sector careers attract individuals who desire more than simply monetary compensation (Wright and Pandey, 2008, p. 515). What this suggests is that in order to properly motivate people (to come to a decision on policy direction for example) public sector organizations should try to converge the motivations of individual public sector employees with the values inherent in the organization. As a practical example, the SCSWCD could communicate how the organization's goals converge with their employees. This would allow both sets of employees (those who believe in the removal of LWD and those who believe it should stay in the stream) to realize that their particular beliefs and values do in fact complement those of the SCSWCD. When doing so, managers should help their employees recognize that the role and value conflicts they experience at work reflect the tenuous balance between the competing responsibilities of public service.

Cho and Faerman (2010) take another look at the psychological implications, in this case from the perspective of employee empowerment. Through their research they view employee productivity (including decision making) as a result not of a set of managerial practices and interventions but rather as a result of an individual's cognitive orientation and psychological state at a micro level" (pp. 36-37). Essentially, what the authors are alluding to is that true empowerment and productively lies with the individual and not within a set of managerial

frameworks devoted to motivation. What this means is that there is no set of structures that could guide employees into a rational decision making process, but rather it is completely up to the individuals themselves to come to agreement and decide on the appropriate policy action to take. In other words, it is a purely attitudinal measure on an individual's part and consensus can only be come to when all the people in the group achieve their psychological requirements.

Empowerment can come in a variety of forms. When employees feel that they have a stake in their organization they are more willing to contribute meaningful work to their agency and to help advance the causes that the organization strives to achieve. When there is a trusting atmosphere, then the decision making process is less burdensome and onerous. Also, decisions that are made are more likely to be implemented and followed rather than if commands were just handed down from the top of the organization (Semercioz, Hassan, & Vantasever, 2010, pg. 75). If trust and accountability exist within the organization, then there is a higher probability that if and when negotiations occur outside the organization with other agencies then a consensus can be reached that achieves the goals and objectives of everyone involved.

Collaboration

Before any sort of discussion can occur on a topic a structure or framework must either be in place or be created to allow for a discourse to begin (Thomson, Perry & Miller, 2007, p. 25). Participants in the collaborative process must come to a mutually agreed upon set of rules which govern how decisions will be made. Organizations collaborate because they need to achieve a like-minded goal. In the case of the SCSWCD, that goal is to create a policy direction on how to manage LWD in Sullivan County.

Similarly, collaborative governance is an important concept that could hold many tools for the SCSWCD. Collaborative governance, as defined by Ansell and Gash (2007), is where multiple stakeholders come together in a common forum to engage in consensus-oriented decision making and seek to either create or implement public policies or programs (pp. 543-544). The term is typically used in reference to state and non-state stakeholders; however, it has been used in association with state versus state situations. Collaborative governance is a good alternative to more traditional forms of consensus building. Collaborative governance provides the opportunity to solve more than just the problems of policy that initially brought all the parties to the table, but also help to provide better collective outcomes for the entire community (Rogers & Weber, 2010, pg. 549). Using collaborative governance could be a useful mechanism for helping to solve the issue of consensus building within the organization.

While collaborative governance may be a mechanism to help SCSWCD employees come to a consensus it is not without its disadvantages. Power imbalances are one of the chief complaints with the use of collaborative governance, especially within environmental organizations (Ansell & Gash, 2007, p. 551). Therefore, strategies need to be developed in order to level the playing field and to allow orderly discussions to take place. In LWD issues, so much of the regulatory aspects occur at the state level. In New York State, environmental regulators are often times open to collaborative mediation, though as mentioned above, power imbalances can and often do exist. Therefore, any collaborative efforts taken should make for the inclusion of a strong leader to ensure that the balance of power is as close to equilibrium as possible. This helps to promote that any outcomes are acceptable to all the parties involved.

When exploring collaborative governance, one of the most important classes of collaboration models is that of network management. This is the key link between collaborative

governance and the management of networks. Although there are a number of models specific to how network management would work the one most relevant to the situation that the SCSWCD is facing focuses on the resources of public management in general terms. Specifically, this model is focused on the acute structural variations found within particular programs or contexts in which those programs are run (Agranoff & McGuire, 2003).

Networked collaboration allows for an avenue of experiences and learning to be shared amongst the members of the network. These networks create institutional forums for new ideas to be processed in a collaborative manner and provide opportunities for stakeholders to discuss problems and solutions. “Networked collaborative governance arrangements are crucial for a culture and practice of adaptive experimentation” (Kallis, Kiparsky, & Norgaard, 2009, p. 637). Collaborative governance provides a way towards resolution when an impasse emerges between organizations concerning a problem they are facing, much as the SCSWCD and other stakeholder agencies are facing an impasse in regards to LWD. By using the collaborative governance as a mechanism for innovate policy solutions, a clearer policy direction may become apparent.

In order for collaboration to be fully effective it needs to occur in networks. Erik –Hans Klijn and Jurian Edelenbos have written extensively on the subject of collaboration in networks and have come to the conclusion that building trust amongst the actors in a network is vital to the success of those networks. This is especially important because there is a number of vital stakeholders outside the SCSWCD that need to be consulted before any policy is adopted. Edelenbos & Klijn (2007) write that modern networks are filled with ambiguity and unpredictability. Institutional complexity hampers the decision making process and an environment of mistrust is bred. In order to counteract this potentially disastrous situation an

environment of trust must be built within the organization (pp. 25-26). Critics have argued that in many situations trust is not needed. Instead, it is argued, that hierarchical structures can be substituted for trust and a top-down approach to management and decision making can be made (Edelenbos, et al, 2007, p. 26).

While in some cases dictatorial decisions made from the top of an organization may be the most efficient way to go, it certainly does not work in every circumstance. If the director of an organization decides on a policy without gaining any input from those lower in the hierarchy, then they risk not only alienating middle-level managers but also missing out on potentially superior policy ideas. Furthermore, it is far from democratic. Edelenbos, et. al. (2007) determines which actions can be taken to help foster trust. They include: intensifying interactions, process management, and institutional design (p.43). Intensifying interaction simply means that the actors (in this case the two opposing ideological factions in SCSWCD) must continue to interact with each other on various projects and tasks within the workplace. The two factions within SCSWCD should continue to interact and work together on projects not related to LWD. This will help to increase the amount of trust between the two parties. Process management requires that renegotiations must be kept to a minimum in order to keep hard feelings at bay. In short, the rules of interaction must be laid out for all the parties to see and appreciate. These rules will determine the extent of risk to be taken and the extent to which opportunistic behavior is to be regulated. If all these actions are followed, trust should be built.

Klijn et. al. (2010) elaborates on the value of trust in governing networks. Here they describe the measures of trust which organizations use to determine whether the relationships among actors will continue. These measures include five factors:

Table 1: Factors of Trust

Agreement of Trust	Parties generally live up to their agreements
Benefit of the Doubt	Parties adopt a favorable opinion or judgment despite the uncertainty involved
Reliability	Parties keep in mind the intention of the other parties
Absence of Opportunistic Behavior	Parties do not use the contributions of other actors for their own benefit
Goodwill Trust	Parties assume that the intentions of the other party are in good principal

Trust is almost never a starting point and must be earned by the individuals in the collaborative network. Trust is built over time through confidence building exercises in which the stakeholders develop productive relationships. It is these relationships that lay the groundwork for trust to grow and ultimately for collaboration to achieve its greatest potential (Head, 2008, p. 740).

By creating a strategy using the above stated principals, greater trust within governance organizations (like the SCSWCD) can be achieved. As it stands, the employees at the SCSWCD hold one another in rather high regard professionally and trust one another in collaborative decision making. They go on to note that the more network strategies that are employed the greater the probability of the outcomes that a consensus among the parties will be determined. They also discovered that contrary to popular belief, the complexity of the issue being discussed had very little impact on whether the parties came to a consensus. This bodes well for a very complex problem such as LWD.

Using Conflict Productively

Any intense debate over a policy direction, especially if the proposed policy is a relatively new one, will result in conflict among the various parties. Traditional thought has held that conflict is something that should be avoided at all costs. However, research scholarship has shed light on a different approach which uses conflict constructively to achieve group consensus. Gregory, McDaniels and Fields (2001) support a process of decision aiding, but vehemently reject any notion that their process is a form of dispute resolution. The authors come up with five steps that are crucial to the decision aiding process:

- 1) Clearly characterize what matters to stakeholders in the form of objectives.
- 2) Create a set of attractive alternatives.
- 3) Employ the best available technical information to characterize effects of the alternatives, including uncertainties.
- 4) Identify the tradeoffs the alternatives entail.
- 5) Summarize the areas of agreement and disagreement and reasons for those views among the stakeholders (Gregory, et. al., 2001, pg. 419).

The authors cite a case study in which they participated on how this process can be used to generate results. The Canadian Province of British Columbia has had a long history of building dams to provide hydroelectric power to its population centers. Historically, it has generally been viewed positively by the general population as it brings jobs and provides cheap electricity. However, in recent years, many concerns have arisen among environmentalists of the impact that dams have on fish populations in its rivers, in particular salmon runs. The authors formed a committee called the Alouette Stakeholder Committee which included all of the interested parties in a proposed construction of a new hydroelectric dam. Using the most recent and informative technical data at their disposal they assessed the tradeoffs that the alternatives would generate

and after lengthy discussions and many meetings they finally decided upon an approach to evaluate the potential new project which included an expression of the tradeoffs by determining the (qualitative or quantitative) pros and cons of alternatives, distinguishing between clear winners or losers and those options requiring further analysis” (Gregory, et. al., 2001, pp. 423-426). This situation is similar to the situation currently facing the SCSWCD.

In contrast to Gregory, McDaniels and Field’s approach, another alternative to consensus building using conflict has arisen. This time with the idea that instead of trying to cultivate group harmony or even to provide a stable framework with logical steps but rather to harness the energy of dissension for useful purposes. Schulz-Hardt, Jochims, & Frey (2002) point out the key to assembling a group with genuinely different perspectives on an issue to form a heterogeneous group with a variety of backgrounds, professions, and opinions. Although this will most likely produce what the authors call task-oriented conflict, this will be a good thing as this will decrease the chance of groupthink arising during discussions. The authors acknowledge that this approach is not without its downfalls including lack of group cohesion and potential for high turnover. This is especially true in heterogeneous groups where the conflict is over deep-seated principles (pp.566-567). Therefore, they advocate for an alternative approach which the above actions are taken, but instead of outwardly seeking out conflict-causing participants in the group, they select a devil’s advocate to quite literally play that role. The role of the devil’s advocate (which can be either an individual group member or a subgroup) is to criticize proposals agreed upon by the rest of the group. This helps to alleviate much of the groupthink that may occur in discussions and allows for the complete analysis of a policy. If the devil’s advocate makes valid points, the proposal can be rejected. If the questions raised by the devil’s advocate are not valid, then the proposal may be accepted.

Methodology

In order to frame the problem correctly, a working knowledge of the science behind LWD management was reviewed including some academic articles and technical papers provided by the SCSWCD staff. As seen in the literature review section of this paper, collaboration and group decision-making literature was also examined in depth. While there is a wealth of information about LWD from a scientific standpoint there is very little about the topic of LWD as it relates to formulating a clear policy direction for an organization.

Since I was unable to rely on previous case studies or a substantial list of documents to devise informed recommendations, I have decided to approach the research problem using an action research approach. I believe that this is the most appropriate route to take because of the dynamics of the policy process involved in the issue of LWD management. It is clear that everyone in the SCSWCD believes that LWD is a problem and that a clear policy direction needs to be established. However, there are differences of opinion on what that policy should be. This lends itself to a dialogic action research approach very well because while there are clear and often passionate differences of opinion the desire to achieve the same organizational goal is firmly held by all of the stakeholders and also because communication among the parties needs to improve. Dialogical action research aims to create an arena for “dialogue as a medium for reflection, mutual learning and democratization” (Mauer & Githens, 2009, pg. 279). In other words, it is vitally important for a medium (such as a focus group meeting) be held in which all the stake holding parties come together to communicate their unique perspectives.

Traditionally, social research has been grounded in meticulous scientific methods where the researcher is mostly an observer to the process going on around him or her. This is not to downplay the very challenging process of traditional social science research. Rather, it is to

draw a distinction between traditional methods and newer techniques. In recent years, a new type of social research has emerged as an alternative to traditional styles of research—action research. Action research is distinct in that the researcher plays an active rather than a passive part in the research. In action research, participants are included in the definition of a problem and the analysis of the problem. Both the researcher and the participants collaborate together in order to make relevant findings, (Comfort, 1985; Greenwood & Levin, 2007).

Dialogical action research relies on individuals, organizations, communities, etc. being critically engaged when undertaking investigation of organizational problems. “This engagement occurs through a critical reflection upon current practices, in particular through and examination of the beliefs, values, tacit assumptions, and mental models informing and shaping practices” (Mauer & Githens, 2009, p. 278). Dialogical action research is particularly suitable for the problem at hand because it forces participants to question dominant organizational values. Dialogical action research relies heavily on defending long held assumptions and asking why previous beliefs or ways of doing things are better than other methods. In this way, the line of questioning and the resulting information that comes out of it is not overly academic or theoretical, but is practical and useful to the organization. In short, dialogical action research requires all the participants to be willing to listen and be receptive to points-of-view other than their own and also to be willing to challenge their own beliefs and the reasons why they hold them. This is not something that is easy for most people to do, however, it is vitally important in order for the organization to come to a consensus on how problems must be tackled and ultimately solved. The SCSWCD and the various other stakeholders in LWD management issues would be suited to this type of dialogue because it forces all the participants to listen to various and often conflicting points-of-view. By genuinely listening and considering an idea

opposite to one's own can lead to a compromise solution, something which is desperately needed at the SCSWCD.

Besides dialogical action research, collaborative inquiry (CI) should also be mentioned simply because this researcher plans on incorporating some elements of both forms of action research into his data collection strategies. The major purpose of CI is to generate new knowledge. However, the ultimate objective that CI has involves all the participants in a democratic process which has the dual goals of implementation as well as the strategy to achieve and measure implementation (Mischen & Sinclair, 2007, p. 155). This researcher has chosen to take this hybrid approach because both areas are useful and provide a greater field of knowledge in which to work from.

This combined Dialogical-CI approach was developed by myself by utilizing the best of both worlds of each particular method. The dialogical part comes in from the course of the method used. In plain terms, the researcher and the focus group (as well as the individual interview participant) held a dialogue where by issues of LWD management were raised, debated, tested, and ultimately decided upon. CI comes into play whereby I incorporated some of its fundamental principles into my research, chiefly, the concept of participative reality. Participative reality "refers to the immanence of mind in nature" (Greenwood & Levin, 2007, pg. 219). In other words, human participation and democratic process are highly valued aspects of this research. Participants in the dialogue were not prejudged based upon their unique experiences which affected their perceptions of LWD management issues. Since the variety of opinions are so diverse, it was imperative that a wide array of representatives from other stakeholder organizations outside of the SCSWCD be included when the research was

conducted. Including outside agency representatives ensured that a democratic and fair participation process in alignment with the goals set out by the Dialogical-CI approach occurred.

Data Collection

Data was collected using a focus group of key stakeholders who are concerned about LWD management in Sullivan County and surrounding areas, principally in the Rondout Creek-Neversink River watersheds. These stakeholders included two representatives from the Sullivan County Soil and Water Conservation District. It also included the supervisor from the Town Denning, NY as well as representatives from the Town of Neversink highway department and planning board. These individuals were selected to participate in the focus group based upon the recommendation of my supervisor in the SCSWCD's Stream Management Program office because put together they offered a diversity of views and opinions about LWD. They were invited to participate in the focus group by either telephone conversation or by a written letter or email. The plan involved having the participants meet in a single room in the Neversink Town Hall with myself acting as a facilitator.

I used a method called brainwriting to collect this qualitative data. Brainwriting is a relatively simple technique which has the potential to yield tremendous results. The brainwriting process began with each participant having a blank sheet of paper in front of them. The participant was then asked to write down on the paper their response to a question that was asked. They had a few minutes to write their responses. After this they passed the paper to the participant sitting adjacent to them and the process continued, but this time with them seeing what the previous author wrote in response to the question. This allowed each participant to view others work and helped them to brainstorm new ideas that they might otherwise not have

come up with on their own. The process continued until all the papers had circled the group. This particular focus group performed this exercise with seven distinct questions. A general discussion of what we as a group learned followed the brainwriting exercise. Data generated from focus group discussion was supplemented by an interview with an individual who was unable to attend the focus group but still wished to contribute information concerning LWD. This individual worked with a local chapter of a national environmental not-for-profit organization.

Study Limitations

In a true action research setting, focus groups would be held over a length of time to gauge trends and differences from baseline data. Because of time constraints on the researcher and scheduling conflicts with the focus group I was only able to hold one focus group relatively late in the research process. Therefore, the results may not be as authoritative as they would have been if data had been collected and analyzed over a longer period of time. Also, diversity on the focus group was somewhat lacking. Many of the members of the focus group tended to have a negative view of LWD and had limited knowledge of the importance that LWD plays in stream hydrology and fluvial geomorphology. If they had had a more thorough education into the science of the role that LWD plays in healthy stream ecology these attitudes could possibly have been different.

Data Analysis

Collected data was analyzed thematically. Data obtained from brainwriting was organized into categories or relevant themes by the focus group members in conjunction with the researcher. There were a number of topics that arose during discussion, though I have chose to focus on the four primary topics of importance that arose most often in the group discussion and

the brainwriting exercise. This was done by the discussion and dialogue among the focus group members. Discussion occurred until a consensus was reached. I kept track with field notes and then calculated the number of times certain themes were brought up and discussed by the participants. This helped the group determine which findings should be focused on in the final document. The researcher used this data to look for major areas of conflict or consensus surrounding the issue of LWD management. By identifying these areas of conflict and consensus, the hope was that a clear policy direction could be established. To reiterate, the findings noted below are the perceptions of the focus group members and the researcher. For a more thorough understanding of data coding scheme please see Appendix B.

Findings

Based upon the thematic analysis of the data collected during the focus group session and from individual interview sessions the following themes were discerned concerning creating a clear policy direction for LWD management. Since the research conducted was classified as Action Research, the participants and myself (in the role of researcher) extensively discussed the issue of LWD management and prepared the following findings. A summary of the findings and a short explanation concerning each finding can be found below in Table 2 (on the following page).

Table 2. Findings Summary

FINDING	EXPLANATION
1. Current LWD management practices are reactive rather than proactive.	LWD is not addressed until it becomes a problem which often means it is more expensive to fix and has already caused damage.
2. LWD has both positive and negative qualities.	Not every piece of LWD is bad .” Sometimes it is beneficial and can remain in the stream without fear of damage to property or infrastructure.
3. The permitting process to do work in a stream is difficult and time consuming.	New York State environmental regulations require that any stream work requiring heavy equipment needs to go through an extensive permitting process
4. Streamside landowners and the public in general are not aware/educated about LWD and both the positive and negative effects it can have on a stream or adjacent lands.	Most people who own streamside property do not have a thorough understanding of LWD and how it can help contribute to a healthy stream ecosystem.

Finding 1: Current LWD management practices are reactive rather than proactive.

By far the most common theme (See Appendix B) to come out of the focus group session and through the individual interviews that I conducted referred to strongly held belief among the participants that current LWD management practices are reactive rather than proactive. What the focus group participants meant by this is that currently LWD is only addressed when it becomes a problem and is either threatening or in imminent danger of threatening infrastructure or property.

For instance, if it is noticed that a tree on a streambank is becoming dislodged and looks like it could fall into a the stream, there is really nothing that can be done about it unless whoever owns the property which the tree is on decides to cut it down so that it does not fall into the

stream in a position that could cause damage. Yet, if during a high water event (i.e. a flood) that same tree becomes dislodged from its position and travels downstream and hits a bridge, then and only then can a public authority such as a town highway department come in and remove the tree or cut it up into manageable pieces. However, by the time it hits the bridge it has caused damage not only to the bridge itself but potentially to land on either side of the stream as it has traversed the course from its original location to the downstream infrastructure. It will now cost whatever municipality that maintains the bridge far more to fix the damage caused by the LWD than it would have if it had cut up the tree to begin with. Not to mention the erosion of soil it may have caused to property on either side of the stream as the LWD came downstream.

All of the participants, including those who advocated the positive nature of LWD, agreed that any future LWD management strategy should be proactive in nature. That is to say, that future management strategies should look toward identifying possible problem LWD and removing them or at the very least repositioning them before they become a problem. This practice could potentially save thousands of taxpayer as well as private dollars.

Finding 2: LWD has both positive and negative qualities.

The participants came to an agreement that LWD has both positive and negative qualities and characteristics that should be taken into account before any management strategy is put into place. Admittedly, this conclusion was a hard swallow, especially for town officials who have to deal with LWD cleanup after high water events. However, after a vigorous debate among the members of the focus group a sort of middle ground was reached. The members who generally held a favorable view of LWD (primarily members of SCSWCD) agreed that LWD has negative characteristics that pose a hazard while the members from the townships acknowledged that

LWD has positive qualities that are beneficial for streams, especially in lieu of the agreement that healthy fisheries (which depend upon LWD) are vital for the economic well-being of many individuals and businesses in Sullivan County. We reached this conclusion by utilizing some of the techniques of using conflict productively (Gregory, McDaniels, & Fields, 2001).

Fisheries experts and stream ecologists brought with them very convincing evidence that LWD can improve the health of a stream. When properly positioned in a stream, LWD provides crucial habitat for aquatic organisms such as rainbow and brook trout. This is vitally important because a great deal of revenue generated in the area comes from fishing and related ecotourism. Even those who were not overly concerned with the ecological benefits of LWD could see the financial burden that could be placed on the community if trout populations plummeted. Scientific reports have shown that climate change has not only produced greater levels precipitation (which lead to floods) but have also raised the water temperature of many area streams which makes for poorer, less healthy habitat for fish among other species. If the tourist trade were to decline or vanish because fish populations are declining this would be particularly detrimental to the economic health of the local community. Therefore, it was decided that LWD should remain in the stream as long as it does not pose a problem to infrastructure or property.

Finding 3: The permitting process to do work in a stream is difficult and time consuming.

Another conclusion that the participants came to was that the process to do any sort of work in a stream that requires a permit is extensive, difficult to do, and time consuming both from the applicant and from the reviewer of the application. As it currently stands, the New York State Department of Environmental Conservation (DEC) oversees the permitting process. If someone wants to do work in the stream using only non-powered tools (such as handsaws) or

small power tools (such as chainsaws) then no permit is required. In some cases an LWD logjam or problem area can be solved using these methods. However, in many situations, especially cases that arise after high water events, large stands of LWD require use of heavy equipment such as bulldozers or backhoes in order for them to be removed. The DEC requires that anyone (including representatives of a municipality or a private individual) who wants to use heavy equipment in a stream needs to file a permit. The permit is difficult to fill out properly especially to those not used to the process. The application requires strict justifications as to why the applicant needs to use heavy equipment. Historically the permitting process was very limited which led to abuses. In an effort to rectify this a permitting system was put into place which makes it exceedingly difficult for anyone to do work in a stream with heavy equipment. Further, it may take weeks if not months for the permit to be processed and then issued. These delays could potentially increase the damage that LWD is causing depending on if it is threatening a road/bridge or positioned in such a way that it is diverting the course of the stream onto previously dry land. Focus group participants expressed concern that the wait time for permit processing is expected to only get worse considering the recent layoffs that the DEC along with other state agencies has faced due to rapidly shrinking budgets.

Finding 4: Streamside landowners and the public in general are not aware/educated about LWD and both the positive and negative effects it can have on a stream or adjacent lands.

The participants perceive that the general public and, more importantly, streamside landowners are woefully ignorant of LWD management issues. This perception is problematic because without appropriate knowledge of the issue and what is at stake then it is virtually impossible for any solutions to take hold. Individuals who own streamside property may notice that year after year they lose land due to erosion yet they may not understand that the large tree

just upstream from them may be causing the problem. Even if they are aware that LWD is in fact the problem they may not know the best practices to manage it effectively. Many people purchase streamside property because they have a love of the outdoors and pursuing outdoor recreation, including fishing. Some streamside landowners may remove all LWD from their property believing that they are helping the stream when in fact they are hurting fish habitat and may wonder why in subsequent years that fish populations decline. Moreover, many individuals do not know where to turn if they are facing LWD issues on their property or where to get help or technical assistance

Recommendations

After compiling the findings based on the data that I analyzed from the participants in my study I developed recommendations based upon those findings. These recommendations are based primarily upon the discussion that occurred in the focus group session as well as the conversation that I had with my individual interview subject. My belief is that these recommendations are practical and pragmatic and actionable by the Sullivan County Soil and Water Conservation District along with their partner agencies. The question that this capstone project set out to answer was “How can the Sullivan County Soil and Water Conservation District develop a clear policy direction for the management of large woody debris?” My hope is that these recommendations serve to at least begin the process of developing a policy for LWD management. A summary of my recommendations follows in the table below (see the following page).

Table 3. Recommendation Summary

RECOMMENDATION	SUMMARY
1. Develop a proactive LWD management policy.	Collaborate with stakeholder agencies to create a proactive approach that will address issues before they become problems rather than after most of the damage has occurred.
2. Encourage removal of bad LWD and the placement of good LWD using best management practices.	Collaborate with stakeholder agencies to create a decision tree or matrix that will supply the needed information concerning when it is best to remove LWD or allow it to remain in place.
3. Streamline the permitting process.	Meet with permitting agencies to discuss a way to streamline and simplify the permitting process. Dedicate a liaison to the permitting agency to facilitate this process.
4. Hold outreach sessions to educate the public about LWD.	Hold outreach sessions in varying locations to educate public about LWD issues. Prepare education materials to be handed out at events or direct mail. Hold separate sessions for general public, professionals who work at clearing LWD and streamside landowners.

Recommendation 1: Develop a proactive LWD management policy.

Throughout the process of researching this project it became clear that current LWD management practices were not working. The findings of this study clearly illustrate that current practices are reactive in nature; waiting until after the damage has been done to do anything.

Any policy that comes about must be proactive rather than reactive.

The most promising way to achieve this objective is to hold a meeting (or more likely a series of meetings) with the pertinent stakeholders. In this case, I have identified the stakeholders as the SCSWCD, representatives from the various towns (such a supervisor or highway superintendant), representatives from the New York State DEC, and representatives from the New York City DEP (because of the abundance of land affected that is part of the New

York City Watershed) and private landowners. I would also strongly consider having a representative from an environmental conservation group be included in the proceedings to offer insights into the importance of healthy stream ecology and to balance the negative views of LWD that most agencies and municipalities hold. Examples of such a group could potentially be Trout Unlimited or the Natural Resources Defense Council. Both of these organizations are environmentally conscious and have presences in Sullivan County.

It is almost certainly inevitable that conflict is going to arise when all these parties with vastly different goals and objectives meet because their interests are often at odds with one another. After the focus group discussion it was learned that the primary goals of the DEC, for example, was to protect the organisms that live in the stream and that protection of private property and public infrastructure were secondary concerns for them. Therefore, I suggest that groups utilize some of the methods and techniques concerning how to use conflict productively. Group members with severely opposing viewpoints could be nominated to act as devil's advocates for the opposite position (Schulz-Hardt, et. al, 2002). For example, a highway superintendant that is adamant about removing LWD before it becomes a problem could be tasked with defending the position of a Trout Unlimited member who understands the benefits of LWD in fisheries production and overall stream ecology. Besides being able to see another point of view in a different light, this could lead to some frank and needed discussion about how to best accomplish the need for a proactive approach to LWD management.

Recommendation 2: Encourage removal of “bad” LWD and the placement of “good” LWD using best management practices.

As noted, LWD has both positive and negative qualities and it can be either harmful or beneficial. Therefore, any policy that is developed concerning LWD management must take into consideration these two distinct characteristics. It is of paramount importance that those who are responsible for the implementation of any LWD policy understand the difference between “good” LWD and “bad” LWD.

Luckily, there is a tremendous amount of research, particularly from universities in the Pacific Northwest, which have conducted extensive research on what constitutes “good” LWD from “bad” LWD. Using this readily available scientific data, I advise that the stakeholder agencies (see Recommendation 1) create a decision tree or a decision matrix of some kind that will allow a worker operating in the field to correctly identify hazardous stands of LWD and remove them while also identifying beneficial stands of LWD and allow them to remain in place. This decision tree should be developed by the stakeholders with technical expertise, who are well versed in the most up-to-date science related to LWD. The technical experts would be expected to adequately explain how the decision tree works and to get as much input from the other stakeholders to ensure that everyone is satisfied that it meets everyone’s expectations.

Since it has been identified that LWD has some very positive qualities for stream ecology, trained workers could actually go into the stream and place stands of LWD so that it could create habitat for fish and other aquatic organisms. Workers would be trained in best management practices to ensure that any LWD that is installed in a stream will be certain to pose no threat to property or infrastructure.

This leads to the second important component of this recommendation which is that a field crew be trained in best management practices for the removal and placement of LWD. This

field crew could be a group of newly hired individuals or from current employees in towns or another stakeholder agency. During the focus group session, one suggestion that came up that proved popular among the members was to hire four or more individuals whose sole duty would be to walk up and down the course of the biggest problem streams and remove hazardous LWD. This LWD management team could be trained in the particulars of stream science and provided with the decision matrix which would allow them to determine which LWD stands are hazardous and which are beneficial. They could also serve as “river watchdogs” in the sense that they could help identify potential problems before they start and also look for invasive species such as Japanese knotweed, Emerald Ash Borer, and the Asian Longhorned beetle, non-native pests which are becoming an ever increasing threat in Sullivan County and the rest of the Catskills region.

The major drawback to this aspect of the recommendation is providing the resources to hire and train such a crew. Even if current personnel had their job descriptions amended to perform the tasks mentioned above the cost could be significant. If new personnel are hired on a full-time basis they will require a salary as well as a benefits package. Even if the work is completed by current staff then other areas of importance that they had been focused on previously may be neglected. One potential solution around the cost issue would be to hire part-time or seasonal workers to complete LWD management projects. It is also entirely possible that these crews could be either paid or unpaid internships for students interested in the environmental conservation field. The SCSWCD could pitch this work as practical field experience for college students who are interested in future careers with environmental organizations or agencies.

Recommendation 3: Streamline the permitting process.

Streamlining the permitting process for stream work is perhaps the most difficult of the recommendations to put into place but in many ways it is the most important. After listening and speaking with many individuals on the town and county level it has become clear that obtaining a permit to use heavy equipment in the stream is difficult. It is also vital if any major project concerning LWD plans to move forward. One approach for implementing this recommendation is to have the stakeholder agency which includes the New York State DEC meet with the appropriate permitting officers to develop a way to simplify the permitting process. Along with the stakeholder agencies I suggest that the elected officials from the New York State Senate and New York State Assembly who represent Sullivan County be included in these discussions.

The decision matrix (see Recommendation 2) could potentially be used as evidence that the work will be done with sound scientific principals and best management practices in mind. If it is explained to the DEC permitting officers that the decision tree was created by knowledgeable technicians using the most recent science and utilizing best management practices, it could reasonably be justified that the permitting process can either be expedited or perhaps even waived.

Complications are sure to arise considering that the DEC has suffered extreme staff cuts in recent months due to the state of the economy and poor New York State budget. The remaining DEC employees will no doubt be forced to take on far more responsibilities than they previous had with little or no raise in compensation. Also, considering that much of the political pressure in New York State is focused on Marcellus Shale natural gas drilling, LWD management may be an afterthought to the remaining DEC permitting staff. No one would blame DEC staffers if they began to suffer from burnout from overwork and no reward.

That is why I suggest that a LWD liaison either be hired by the SCSWCD or appointed from the current pool of employees. The LWD liaison's chief mission would be to bring permitting questions and issues directly to the DEC staff and act as an advocate for the SCSWCD and the other agency stakeholders. The LWD liaison could even assist the staff with the permit vetting process. It would be imperative that the LWD liaison not act as an adversary, but rather as a colleague. This could help with psychological motivations for the DEC permitting officers to remember their public service motivation (Taylor, 2008). Helping to rekindle the desire for public service, even in difficult circumstances such as the New York State government now faces, will certainly go a long way in ensuring that state environmental regulators recognize the importance of managing LWD in its waterways.

Recommendation 4: Hold outreach sessions to educate the public about LWD.

In the course of preparing this document it has become all too clear that the public in general and streamside landowners in particular are often lacking in basic knowledge about stream ecology and elementary hydrology (See Finding 4). Therefore, I strongly recommend that education and outreach sessions be created and conducted to educate the public about basic stream ecology and hydrology of which LWD plays a very important role. Already there are some programs in place which do this. The SCSWCD currently has a stream program office which holds outreach sessions periodically throughout the year. If these outreach sessions are expanded they could reach a wider audience of people. More outreach sessions geared specifically for LWD issues should bring in a sizeable audience.

Besides the stakeholder agencies, SCSWCD could partner with local educational institutions such as Sullivan County Community College, Ulster County Community College,

and Cornell Cooperative Extension to provide citizen education. It may also be beneficial to create programs in conjunction with local school districts. For example, the Tri-Valley Central School District is located near both the Rondout Creek and the Neversink River, two of the major waterways in the area that the stakeholder agencies manage. These streams have numerous examples of both “good” and “bad” LWD. Students could be assigned projects under the supervision of SCSWCD staff or qualified stakeholder agency staff members. These projects could potentially consist of locating and evaluating stands of LWD and deciding if they are hazardous or beneficial. Besides the obvious benefits for LWD management this could also be used as an opportunity to teach local students the importance of environmental conservation with hands-on experience from their backyards. They may even be able to assist the team of professional LWD managers in their duties (see Recommendation 2).

I also strongly suggest that SCSWCD create special information sessions for different stakeholder groups. The reason for this is because different stakeholder groups have different interests regarding the management of LWD. One type of session should be geared for the general public with basic information about LWD management. It would be important for the general public to be aware of LWD issues because not only does it bring exposure to the work that the SCSWCD does, but also to help address the serious lack of basic scientific education among residents in Sullivan County and greater Catskill Mountains region. Pitching these sessions as something that could be affecting your own backyard could spur attendance. Another type of session should be geared for streamside landowners with information pertinent to that demographic, such as the benefits that LWD has for fisheries and the importance of quickly identifying the removing hazardous LWD before it has the opportunity to cause extensive damage. Another session should be focused on the needs of town officials, in

particular highway personnel who all too often have to deal with the aftermath of LWD damage and high water events. The type of information conveyed in these sessions should be beneficial to the needs of that particular demographic such as how to best remove LWD from the stream by causing as little disturbance of the natural ecosystem as possible.

Finally, SCSWCD should ensure that an ample supply of informational brochures and packets on a diverse number of topics, including LWD, should be made available in their offices and to the offices of the other stakeholder agencies. This information should also be made available on the web for easy, 24-hour access. However, it is vitally imperative that the primary means of information dissemination be done using traditional, non-electronic methods. The reason behind this is because a majority of the residents in Sullivan County and in the greater Catskills region are considered to be elderly. Many of these citizens have limited computer skills or may not own a personal computer. Those that do may be hampered by the spotty availability of high-speed internet access in the region. Therefore, it is critical to supply a variety of methods (both traditional and new media) when preparing outreach plans. It may also be wise to consider periodic mailings (both traditional and electronic versions) to interested parties and individuals. It may be appropriate to create a listserv or a mass mailing list to bring about this objective.

Conclusion

It is not cliché to say that for millennia LWD has played an important ecological function in the Catskill Mountain region. It is only in relatively recent years as humanity has moved into the region and developed homes, properties, and infrastructure improvements on the land that LWD began to cause problems for those who choose to live in this beautiful and environmentally vibrant region. Previous attempts to manage LWD have fallen short of its intended goals and have even caused unexpected, and sometimes tragic, environmental consequences. Combining

poor management practices with the ever looming threat of global climate change which raises the average temperature and precipitation levels of the region makes for an even more immediate need for a proactive management strategy that is acceptable to both environmentalists concerned with the health and vitality of the stream and administrators concerned with the safety of roads, bridges, and other public infrastructure.

The information provided in this analysis provides useful guidance to the SCSWCD and other stakeholder agencies wrestling with LWD. Collaboration between private citizens, not-for-profit environmental organizations, and government agencies is needed in order for goals of all concerned to be realized. Although at first glance it may appear that these parties are polar opposites with opposing viewpoints, the reality is that they have far more in common than they may realize. With this realization comes the opportunity to create a policy which can benefit everyone involved.

It is everyone's responsibility to be good stewards of our natural environment. It is what gives us our very lives and without it, all the money and power in the world would be for naught. Therefore, it is essential that groups like the SCSWCD and other likeminded organizations join together to ensure a sustainable future where New York's rivers, streams and countless other waterways remain safe and healthy for generations to come.

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Appendix A:

Human Subjects Exemption Form

Date: October 18, 2010
To: Brent Gotsch, DPA
From: Anne M. Casella, CIP Administrator

Human Subjects Research Review Committee

Subject: Human Subjects Research Approval

Protocol Number: 1524-10

Protocol title: *How can the Sullivan County Soil & Water Conservation District develop a clear policy direction for the management of large woody debris?*

Your project identified above was reviewed by the HSRRC and has received an Exempt approval pursuant to the Department of Health and Human Services (DHHS) regulations, 45 CFR 46.101(b)(2) .

An exempt status signifies that you will not be required to submit a Continuing Review application as long as your project involving human subjects remains unchanged. If your project undergoes any changes these changes must be reported to our office prior to implementation, using the form listed below:

http://humansubjects.binghamton.edu/2009_Forms/012_Modification%20Form.rtf

Any unanticipated problems and/or complaints related to your use of human subjects in this project must be reported, using the form listed below, <http://humansubjects.binghamton.edu/Forms/Forms/Adverse%20Event%20Form.rtf> and delivered to the Human Subjects Research Review Office within five days. This is required so that the HSRRC can institute or update protective measures for human subjects as may be necessary. In addition, under the University's Assurance with the U.S. Department of Health and Human Services, Binghamton University must report certain events to the federal government. These reportable events include deaths, injuries, adverse reactions or unforeseen risks to human subjects. These reports must be made regardless of the source of funding or exempt status of your project.

University policy requires you to maintain as a part of your records, any documents pertaining to the use of human subjects in your research. This includes any information or materials conveyed to, and received from, the subjects, as well as any executed consent forms, data and analysis results. These records must be maintained for at least six years after project completion or termination. If this is a funded project, you should be aware that these records are subject to inspection and review by authorized representative of the University, State and Federal governments.

Please notify this office when your project is complete by completing and forwarding to our office the following form:

<http://humansubjects.binghamton.edu/Forms/Forms/Protocol%20Closure%20Form.rtf>

Upon notification we will close the above referenced file. Any reactivation of the project will require a new application.

This documentation is being provided to you via email. A hard copy will not be mailed unless you request us to do so.

Thank you for your cooperation, I wish you success in your research, and please do not hesitate to contact our office if you have any questions or require further assistance.

cc: file

David Campbell

Diane Bulizak, Secretary

Human Subjects Research Review Office

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Appendix B

Data Analysis Coding Scheme

Theme	Number of Times It Occurred In Discussion	Examples of Key Phrases/Concepts That Arose
Current practices are reactive rather than proactive	9	<p>–I have only seen LWD managed after a flood event, and that has been done on a very limited basis.”</p> <p>–Before a flood happens LWD should be inspected to see if it is a threat.”</p>
LWD is good and bad	7	<p>–LWD has caused tremendous amount of damage to the local bridges.”</p> <p>–LWD has cost the township thousands of dollars (because of having to pay to deal with clean-up after floods).”</p> <p>–We need LWD to help fish habitat. If fish populations get any worse, the economy will tank!”</p>
Permitting process is flawed	8	<p>–Why do I have to wait weeks for a permit when I can tell that the bulldozer isn’t going to make the situation any worse?”</p> <p>–If we use best generally held best management practices, there is no need to wait two months for the application to be processed.”</p>
People are not knowledgeable about LWD	5	<p>–Many people just don’t get stream science. They don’t understand that their actions are hurting the environment.”</p> <p>–Many crews are not up-to-date on appropriate best</p>

		management practices.”
Liability concerns	3	<p>–Who is ultimately liable if someone gets hurt because of LWD?”</p> <p>–Liability ultimately falls on the landowner (where LWD is) but that won’t stop someone from suing the town claiming that they should have done something. It’ll cost us money even if the lawsuit is eventually thrown out of court.”</p>
Revive a Civilian Conservation Corps-type of organization	2	<p>–With all the people (especially young people) who are unemployed because of the economy why can’t we get the government to pay for them to do field work on the stream? At least it gives them a steady paycheck.”</p> <p>–It would be nice for the government to put its money where its mouth is and actually <u>go green</u> by encouraging people to do public works in a conservation type field.”</p>