

ELEMENTS OF AN URBAN TREE RISK MANAGEMENT PROGRAM

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The development of effective hazard trees assessment practices has been an important focus of urban forestry for many years. When a publicly owned tree fails and causes property damage, personal injury or death in the United States, a potential consequence for a government agency is litigation.

Although managing a large public tree resource can seem daunting, simple assessment parameters can be used to identify high-risk features within the tree population. Through analysis of the interaction between high-risk elements in the tree population and definition of a long-term, managed approach to tree risk reduction, strong policies and practices can be initiated.

This program emphasizes two concepts. First, implementation of a well thought out risk reduction strategy improves the overall health of the urban forest, which results in a safer urban environment. This goal is universal, regardless of national boundaries. Second, documentation and implementation of tree risk management policies forms the foundation for a government agency's defense, if litigation ever occurred.

RISK MANAGEMENT APPLIED TO TREES

Oftentimes, risk management is conceptualized as the ability to minimize the occurrence of harm or loss through implementation of sound risk reduction strategies. Consequently, government agencies should consider two general forms of risk when developing their policies: risk of physical harm and financial loss.

The risk of physical harm is a concept that encompasses property damage and personal injury. This risk is unavoidable when trees are present. Both the individuals who use the public space and municipal staff who work amongst these trees bear the greatest potential for this type of harm. Alternately, if harm occurs, the tree's owner assumes the financial risk from a tree or tree part failure. This responsibility influences how some programs attend to the management of risk. Paradoxically, many communities manage with attention to financial concerns; whereas, a healthy tree risk program focuses on minimizing the possibility of physical harm.

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Two recent court cases illustrate how unclear tree-risk management policies affect litigation outcomes. In *Purdy v. The Village of Maywood* (1997), one of two main scaffold limbs failed from a thirty-three inch diameter Green Ash (*Fraxinus pennsylvanica*) and caused two fatalities. The Ash, which was located behind the sidewalk, was determined to be a boundary tree: co-owned by the resident and the municipality. The tree in question had a large, observable pre-failure



Photo 1: *Fraxinus pennsylvanica*, Village of Maywood, Illinois, USA

crack between the two main scaffolds. During the case's discovery phase, it was determined that the Village relied exclusively on service requests from residents to initiate any pruning on public trees. The Village had no cyclic pruning program, which may have facilitated hazardous tree identification, and staff were poorly trained in arboricultural techniques and hazard tree assessments. Finally, the Village had a poor understanding of the location of the tree and the legal responsibility of this co-ownership. When these program features were enunciated, the Village eventually settled out of court for 3.25 Million Dollars.



Photo 2: *Pseudotsuga menziesii* failure, Whitefish Lake Campground, Montana, USA

In another case, a forty-three inch diameter Douglas fir (*Pseudotsuga menziesii*) in a State of Montana campground failed during a high wind event and crushed a trailer that held four occupants. Although the occupants survived the accident, they sought restitution for minor medical expenses, lost wages, emotional trauma, and replacement of the trailer.

The author's assessment found numerous policy failings by the State of Montana, including no clear State-wide tree risk assessment program for the numerous campgrounds that were maintained and managed by the State. It was also determined that State staff were poorly trained in evaluating trees in regard to their risk potential. The State eventually settled out of court for all damages.

These two cases illustrate some of the primary issues pertinent to tree risk management. The crucial, programmatic problems identified within the Village of Maywood and the State of Montana tree risk programs can be divided into issues at the micro- and macro-scale, or policies related to individual trees and the entire system being managed,

respectively. These are the two scales of management to consider when formulating a tree risk management policy. The policies for managing risk on these scales, specifically the individual tree and the urban forest, are very different, but each is an integral element of a comprehensive urban forestry risk management program.

The micro-scale policies refer to the individual tree. Micro-scale policy focuses on practices that increase knowledge, skills and experience to better assess individual trees for risk. Clearly, the emphasis is on refining personnel training experiences. Staff must be effective with tree assessment procedures and be able to make reasonable assumptions about tree failure potential as a result. This level of preparation produces highly professional staff, who are trained to make the best choices in arboricultural care and mitigation when assessing or working with an individual tree.

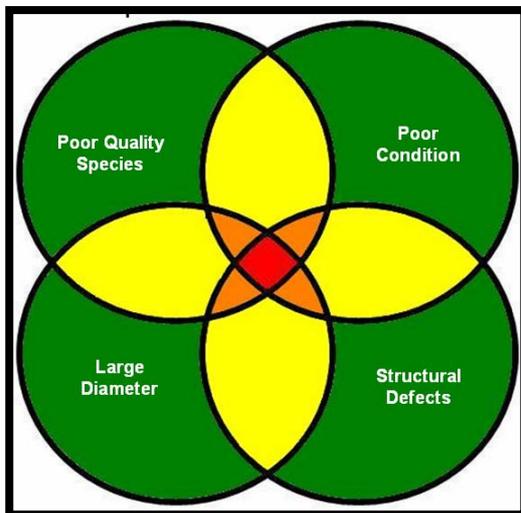


Figure 1: Venn Diagram – Intersection of high-risk tree features.

While the micro-scale focuses on individual trees, the macro-scale refers to the entire system of trees being managed. The management of a large number of trees requires that decisions be made regarding the care individual trees receive and when, whether immediately or sometime in the future. Specific policies for this scale strive to reduce high-risk features in the population over time through long-term management. Critical questions at this level include: What elements of the population pose the highest risk over time to the public? And, how does the municipality address

these large forest level issues? Figure 1 demonstrates a conceptual approach to defining risk within the entire urban forest. The various intersections of high-risk features assist in refining what portion of the population pose the highest potential risk of causing harm. For example, a community may select Poor Quality Species and Structural Defects as their program's tree risk management emphasis based upon their understandings of the community's tree and capital resources. A tree inventory allows a manager to quantify these interactions. The macro-scale attends to the urban forest as a municipal resource, as much as part of a community's infrastructure such as sidewalks, street lights, and roads, which also require regularly maintenance and planning.

MANAGING RISK THROUGH POLICY

Policy is conceptualized as "a line of argument rationalizing a course of action". The importance of a documented municipal tree risk policy cannot be emphasized enough. There

are two essential reasons for having a documented policy. First and foremost, it clearly defines the direction and actions the municipality will follow to manage risks associated with their tree resource. Second, if implemented, a documented policy is the cornerstone for any defense if litigation ever occurred as a result of a tree, or tree part, failure. A tree risk policy demonstrates that an agency directly confronted the issue and took the necessary steps to address it.

Conversely, having an implemented tree risk policy is preferable over having no policy at all. Most communities have an assigned duty to be informed of potential risks to the public. Inattention to this duty places a community at a greater disadvantage if litigation occurs. Policy is not only interpreted by the written word, but also by a community's actions. Actions taken that are contrary to written policy or inaction can nullify the existing written policy.

Tree risk policy is defined by government agencies through numerous documents. Each document plays a unique role in the overall policy. A strong, comprehensive tree risk policy would include all of the following:

Ordinances: Ordinances are regulations enacted by municipal government. Tree ordinances define the legal interaction between the public, the City, and its trees. Ordinances, by definition, are restrictive. They define, among other things, what a private individual can and cannot do to a publicly-owned tree. In some areas of the country, these restrictions may even extend to trees on private property. Ordinances best address tree risk policies by:

- ☞ Mitigating high-risk trees on private property that may affect the public.
- ☞ Defining inappropriate tree-related activities (e.g., planting restricted species, compelling a private entity to remove trees that threaten public property, or causing damage to any public tree)
- ☞ Providing the definition of a boundary tree.
- ☞ Establishing a sidewalk clearance standard for private property trees.
- ☞ Referencing Arboricultural Standards.

Urban Forestry Strategic/Master Plan: Strategic Plans define long- and short-term goals for the urban/community forestry program. Master Plans define how the individual goals are achieved through an action plan. As a policy document, both types of plans can define the overall risk management goals of the city.

Arboricultural Standards: Through attention to standards, municipalities accept the Best Management Practices (BMP) for the care of public-owned trees. The standards are applied universally to all public trees regardless of who performs the work. They guarantee that, if

invoked, a healthy, vigorous urban forest will be perpetuated. The document demonstrates that the community is following the urban forestry profession's current practices.

Planting Plan: This document defines the long-term choice of species the city intends to plant. The infrastructure constraints of every street are also defined to guarantee that tree health and form are optimized over the tree's life. This document forms the foundation for quantifying the community's long-term policy on species diversity and the intent to plant a healthy urban forest.

Tree Risk Management Plan: The Tree Risk Management Plan can be a component of the Urban Forestry Master Plan. More times than not, it is a separate document. The Tree Risk Management Plan defines the community's complete tree risk program.

Tree Risk Management Plan

The Tree Risk Management Plan defines the current tree risk program for the city. It articulates the community's total policy on risk trees both at the micro and macro scales. A basic plan should contain at least seven elements.

Resource Assessment: This document reflects an assessment of the community's tree resource, operational program, and available resources (e.g. budget, staff, and equipment). Typically this assessment is a component of an urban forestry master plan. Documentation of the resource is the basis through which all goals, action plans, and outcomes are derived as well as the foundation for policy development. The assessment should include, among other things, an understanding of the following:

- ☞ Species Distribution
- ☞ Diameter Distribution
- ☞ Condition Distribution
- ☞ Locations and Targets
- ☞ Staffing/Equipment
- ☞ Budget

Risk Zone Map: The risk zone map has two primary functions. Communities with a minimal forestry program use it to establish both a risk tree monitoring program and a response priority matrix for major storm events. Communities with established forestry programs use the risk zone map's priority matrix to respond to major storm events. The cyclic pruning

program for these communities typically serves as the monitoring device. Examples of the risk zone map used by three dissimilar cases follows.

1. Worcester, Vermont – In rural Vermont, the town (township) is the local form of government. The majority of maintained roads for these towns are rural. The State's Agency of Transportation established four types of roads based on use, surface and maintenance responsibility. Using these designations, the Town of Worcester established risk zones: High, Moderate and Low. The highest risk roads require annual inspections. The moderate risk roads are inspected every three years, and the lowest risk roads are inspected only after storms.

2. Shorewood Hills, Wisconsin – The Village of Shorewood Hills is a small urban community. In 2003, the Village defined a goal to develop a tree risk management policy. One of the objectives of the project was to include a risk zone map. Based on use, emergency vehicle access, and a village-wide mature tree overstory, two zones were established High (red) and Moderate (Orange).

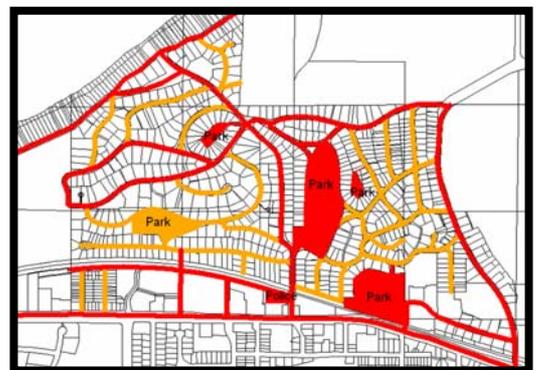


Figure 2: Risk Zone Map – Village of Maywood, Illinois, USA

3. Glacier National Park, Montana – Glacier Park is a very large, Federal park with hundreds of campsites, hundreds of trail miles, and 2.5 million annual visitors. In 1995, a review of the Park's tree risk program resulted in the development of a risk zone map that allowed staff to refine and improve the Park's overall tree risk management program. Figure 3 shows how the Park is differentiated by high-use sites (red arrows) and low-use (blue arrow). High use areas include high-volume roads, hotels, car campgrounds, and popular trails. The low use areas are dominated by backcountry hiking trails and remote campgrounds.

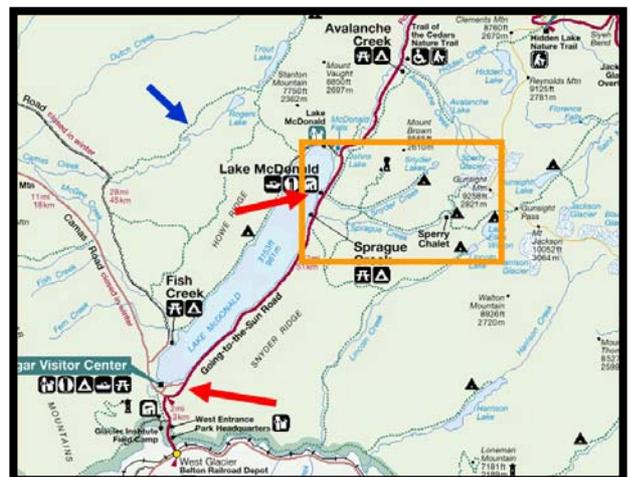


Figure 3: Risk Zone Map – Glacier National Park, Montana, USA

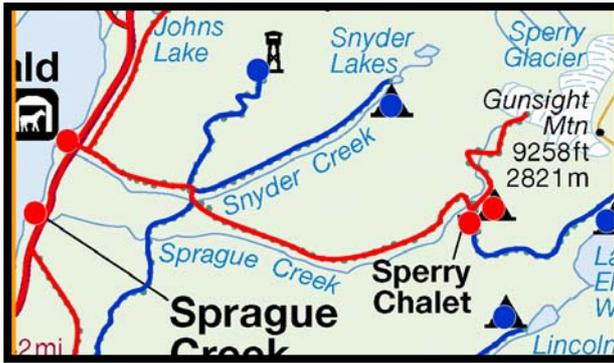


Figure 4: Risk Zone Map (Detail) – Glacier National Park

A two-tiered, risk assessment plan was recommended that differentiated high-use areas from low-use trails and structures. Figure 4 displays this differentiation. Red signifies high use. Blue identifies low use. Assessment schedules and mitigation responses were designed to address the level of risk associated with the intensity of use. This policy modification allowed

resources to be used more effectively.

Goals: Goals define a program's short- and long-term direction. An evaluation of the tree and management resources should identify problem areas within the population. Further, it should also identify operational issues. **Solutions** to both types of problem areas are the basis for defining the risk reduction goals. The following are examples of some risk reduction goals, in no particular order:

- ☞ Hire an Urban Forester
- ☞ Conduct a complete tree inventory
- ☞ Reduce poor or worse conditioned trees
- ☞ Develop a tree risk zone map
- ☞ Provide or increase staff tree risk training opportunities
- ☞ Reduce high-risk species
- ☞ Develop a policy on boundary trees
- ☞ Develop a policy on line of sight inspections
- ☞ Implement a cyclic pruning program

Action Plan/Outcomes: An action plan outlines the sequential tasks required to successfully realize each goal. The action plan addresses each of the following questions. What needs to be accomplished? Who will accomplish it? And, when will it be accomplished? Each task must have a clear and identifiable outcome, although some steps may have intermediate milestones. The final outcome is the achievement of the goal.

Tree Failure Journal: A tree failure journal allows staff to better understand the circumstances surrounding failures in their particular community. Staff should, as a team, carefully assess the circumstances surrounding any significant failure. The knowledge and experience gained by staff in these events is substantial. Consequently, staff skills and

abilities regarding interpreting future defects become more refined. Documenting the significant failures demonstrates that the community takes every opportunity to learn from actual events. Participation in the International Tree Failure Database program (<http://ftcweb.fs.fed.us/natfdb/>) would allow greater numbers of people to learn from these failures.

Staff Training Journal: The journal lists all training for each employee. It is a quick reference that verifies that staff is receiving ongoing and pertinent education. It also assists in identifying specific employees' training needs. It also demonstrates that management supports staff training.

Annual Review: An annual review allows staff the opportunity to assess and critique the program over the last year. Staff use this time to determine whether the defined goals are being met. If they are not being met, as a team they address the reasons why and discuss and identify the change(s) needed in their program to realize the planned outcomes.

CONCLUSION

Professionals who maintain and manage large numbers of trees can develop progressive risk reduction strategies that are also reasonable, achievable, and defensible. A community implements a tree risk management program to minimize the risk of physical harm or property damage from occurring. A documented policy is an important and necessary element of a proactive and defensible tree risk management program. If implemented, it will:

- ☞ Establish a clear definition of the direction and actions the municipality will follow to manage their tree resource for risk.
- ☞ Form the basis for defense if litigation occurred resulting from a tree or tree part failure.

Policies are constructed that relate to day-to-day operations, long-term risk reduction goals, planting programs, staff training, and ordinance improvements. These enacted policies reduce the long-term risk of harm to the public and thus reduce the financial risk carried by the municipality.

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