

Pre-Climb TREE HAZARD ASSESSMENT

By Dr. Brian Kane

A tree that looks healthy with a full crown isn't necessarily safe to climb. Despite appearances, you have to do a risk assessment – and you should try to do it the same way every time.

A systematic assessment gets you into a set pattern so you are less likely to overlook something. Make sure you examine the tree from top to bottom and from all sides. Looking from a single side can cause you to miss a concrete-filled cavity or poison ivy or a bee's nest. Make sure you move away any vines that are obscuring parts of the tree and check for things that are not easy to see. You may need to scrape soil away from the root flare if it looks like that tree has been buried with fill. Don't guess. Dig away the soil and see what the root system looks like. If you set your throw line over a branch 70 feet up, make sure you are tied in to a good branch. Use a pair of binoculars to check that branch from the ground.

Let's take a look at four common defects in trees:

1. Root defects
2. Stem decay
3. Weak crotch with included bark
4. Dead branches

Root defects

Root decay/damage is one of the most common defects. If the tree suffered recent construction damage and hasn't started dying back from root loss yet, you have to look very closely to figure out what is going on. Construction will damage roots, how badly they're damaged depends on how much care was taken during construction.

Ripping roots with a backhoe or bulldozer will damage roots much more than



Root damage to a Norway maple; such damage is often covered by new plantings or turf and might not be immediately visible.

excavating around them and cutting them cleanly with a saw. Making good cuts will speed up the process of new roots forming at the cuts. When roots are ripped or broken, decay spreads more quickly and roots do not regenerate as quickly. Soil compaction from heavy equipment can also limit oxygen in the soil and kill roots.

The difficult thing for arborists is that very rarely are we called in before damage has occurred. This forces an arborist to be a bit of a detective to determine the extent of root damage. New flower plantings or new turfgrass around trees often indicates that construction has occurred in the vicinity. Ask clients about sprinkler systems, walkways, foundations, and other things that would have required digging around trees.

If a tree has started to decline and you notice dead branches and dieback from the tips of branches, that may indicate that roots have been damaged. Take the time to check root systems on any tree that shows such signs of decline.

Another sign of roots that have started to decay after being broken or cut is fruiting bodies (mushrooms, conks) that form in the soil or around the base of the tree. It's important to remember that just because you see fruiting bodies doesn't mean root decay is present and just because you don't see fruiting bodies doesn't mean that the roots are not decayed. There are lots of fungi that produce fruiting bodies in the soil but not all of them are decay fungi. So it's important to check the roots themselves if you see fruiting bodies. On the other hand, fungi only produce fruiting bodies when conditions are appropriate. If it's the wrong time of year or too cold or too dry or too hot, even if decay fungi are present in the roots, fruiting bodies might not be produced.

Trees that have lost more than 50 percent of the root system should be considered hazardous and may not be safe to climb. If you see straight lines on a root flare the chances are something has been done to it. Be conscious of the signs that indicate root damage. It is not likely that you are going

to be there the day the damage occurs.

Stem defects

Always inspect the root flare, if you see decay at the flare, it is usually a pretty good bet it goes down into the root system.

Other stem defects include splits or cracks. A crack that goes all the way through the tree is obviously a dangerous situation. Cracks that are at right angles to one another are equally dangerous. Be really careful when working in trees with these visible defects. Cracks come in two different kinds – vertical and horizontal.

Any time you have a wound on a tree, you will see some sort of discoloration and decay. How much decay depends on many factors. Fungi decay wood by breaking down the wood; some fungi digest mostly lignin, others digest mostly cellulose. As cellulose and lignin are digested, the wood loses strength, making it more dangerous to climb. If you are going to remove a tree and you're unsure about decay, drilling into it to get an idea of how much decay is present is a good idea.

If you see decay or a hollow, look for carpenter ant sawdust. Carpenter ants only chew on wood that is decayed in some way and it can be a great way to locate decay that might not otherwise be visible. Indications of other types of wildlife such as squirrels, raccoons, and bees also mean that decay is present in the tree.

However, just because you don't have a hollow tree doesn't mean you can't have decay, because fungi can decay wood without digesting it completely and making the tree hollow. Wood can appear solid, but may be punky or spongy; such wood has obviously lost most of its strength.

Trees that have decay that makes the tree like a hollow tube are more likely to fail when they are greater than 70 percent hollow. However, if the decay is off-center, a 50 percent hollow can also make the tree dangerous to climb. Finally, if you have an open cavity greater than 1/3 of the circumference of the stem, you run a greater risk



Trees that have lost more than 50 percent of the root system should be considered hazardous and may not be safe to climb. A root system with a straight edge is an obvious case of cut roots.

of tree failure.

There are some guidelines for sound wood that are important to remember. For every 6 inches of diameter you want an inch of sound wood that goes all the way around it. If you have a tree that has an open cavity, and the cavity's width is 20 percent of the circumference, then you want an inch and a half of sound wood for every 6 inches of diameter. If you have a cavity that is 30 percent of the circumference, you want to have 2 inches of sound wood for every 6 inches of diameter. You must also consider what you're going to be doing in the tree. If you need to shock load the trunk chunk-

ing out big pieces of wood, then be more conservative when deciding to climb a hazard tree or not. If you don't have to lower anything or if you can let pieces run to the ground, you can be a little less conservative when deciding to climb. The guidelines above are useful, but your experience will also be valuable when deciding whether to climb a hazard tree.

Another factor to consider is tree species. Obviously, an oak has stronger wood than a willow, so if you have an oak with just enough sound wood it's a good bet that the tree will be safe to climb. If you have a willow tree that's just on the borderline of having enough



Here is a horizontal crack in a buttress root of a large hickory; the crack extends across the entire root and continues into the trunk. Notice, too, the amount of decay in the root where it is cracked. This is a very dangerous situation.

sound wood, it might be better not to climb that tree.

Branch defects

There are many types of branch defects such as, cracks or splits, decay, dead branches, and weak crotches.

As with trunks, you can get cracks and splits in the crown. Cracked branches can be dangerous if you put your climbing line over one, but as long as you avoid them, it can be safe to climb the tree and work around them. Dead branches are an obvious hazard, it's important to remember that some species can drop branches as soon as they're dead, whereas others hold onto their branches longer. Hangers are dangerous when felling a tree and when climbing because they can strike you or a ground worker.

Weak crotches are dangerous when climbing. Look for V-shaped crotches, included bark, and co-dominant stems. Weak crotches with a crack between them are particular dangerous. It's important to recognize that even if there is a nice U-shaped attachment between co-dominant stems, the attachment can still be quite weak.

The last thing to remember about structural defects in trees is that when the defects are connected to one another, the risk of failure is much greater. Common examples of connected defects include weak crotches with a crack or decay, leaning trees with cavities or decay, and root and/or buttress flare decay.

How do we address some of these defects? One way is the pull test: set your climbing line in the tree and pull on the tree from different directions so that you can see how it moves. You can feel how the tree responds as you are pulling on it. If you get the rope up high enough you can get even big trees to move a little bit. As you are pulling look at the base of the tree for roots picking up out of the ground or soil movement or cracking around the roots. These are signs of serious root problems. Pull on a weak crotch like you are

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Decay does not always cause hollow trees. Here is a decayed trunk that had no obvious signs of internal decay. It would have taken a drill sample to determine the decay was present.

something wrong with the roots or with the structure of the tree.

If you're uncomfortable climbing a tree, perhaps there's another way to work in it, for example by using a bucket truck or crane. Recent articles in TCI have highlighted the new 'portable' aerial lift devices that may be able to make it into tight backyards. You might also be able to tie-in to a nearby tree and then climb the potentially hazardous one. Cracks can be cinched up with binder chains or ratcheting straps.

If you have a co-dominant stem and you know that you have to take one of the leads off and you have to butt hitch it, you can run a rope between those two co-dominant stems and tie it off with a friction hitch just to tighten it up. It isn't going to be like a steel cable but it will at least be some security so the crotch doesn't split apart on you.

If at all possible, when you are not sure about how much force rigging a piece will put on the tree, take a smaller piece.

trying to pull it apart and see how the tree responds. You should get a nice pattern of swaying back and forth. If you get a jerky motion, that is an indication that there is

Non-structural hazards

Lots of animals and insects live in potentially hazardous trees. Raccoons, squirrels, and hornets prefer to nest in hollow trees. Some types of hornets also make 'paper' nests that hang from branches of non-hazardous trees. Always inspect a tree carefully for these sorts of residents – they usually won't bother you, but if they feel threatened, they can bite or sting. Always climb while tied in because you never know when a squirrel might scare you and if you're not tied in, it could be a long (and painful) trip to the ground.


Lots of plants also live on trees. Poison ivy is an obvious hazard, especially if you're allergic to it. English ivy and Virginia creeper, even though they don't cause rashes can cover a trunk, hiding defects. Always remove ivy from a trunk if you suspect that there's decay or a crack or some type of defect that might be hidden.

If you are doing any work and you have Oriental bittersweet hanging up between adjacent trees, be careful. Make sure that the bittersweet isn't going to interfere with your felling plan or won't hang on to the top if you're trying to drop it.

Lastly, there are non-living things in trees to watch out for. Cables and old hardware can hang up a branch or top, they can also damage a chain very quickly. If you are in an old tree and you see a lot of cables expect that there is hardware stuck somewhere where you may not be looking for it.

Conclusion

Consider what you are doing in the tree, what the environmental conditions are and also what the canopy looks like. Is the canopy big or is the tree dying back. Is it a healthy tree? All of these things are going to have to be factored into your assessment when you are on the site. The general rules covered in this article are a good starting point, but your observations and daily experience are equally valuable.

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