Risk Assessment

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Definition of Hazardous Trees

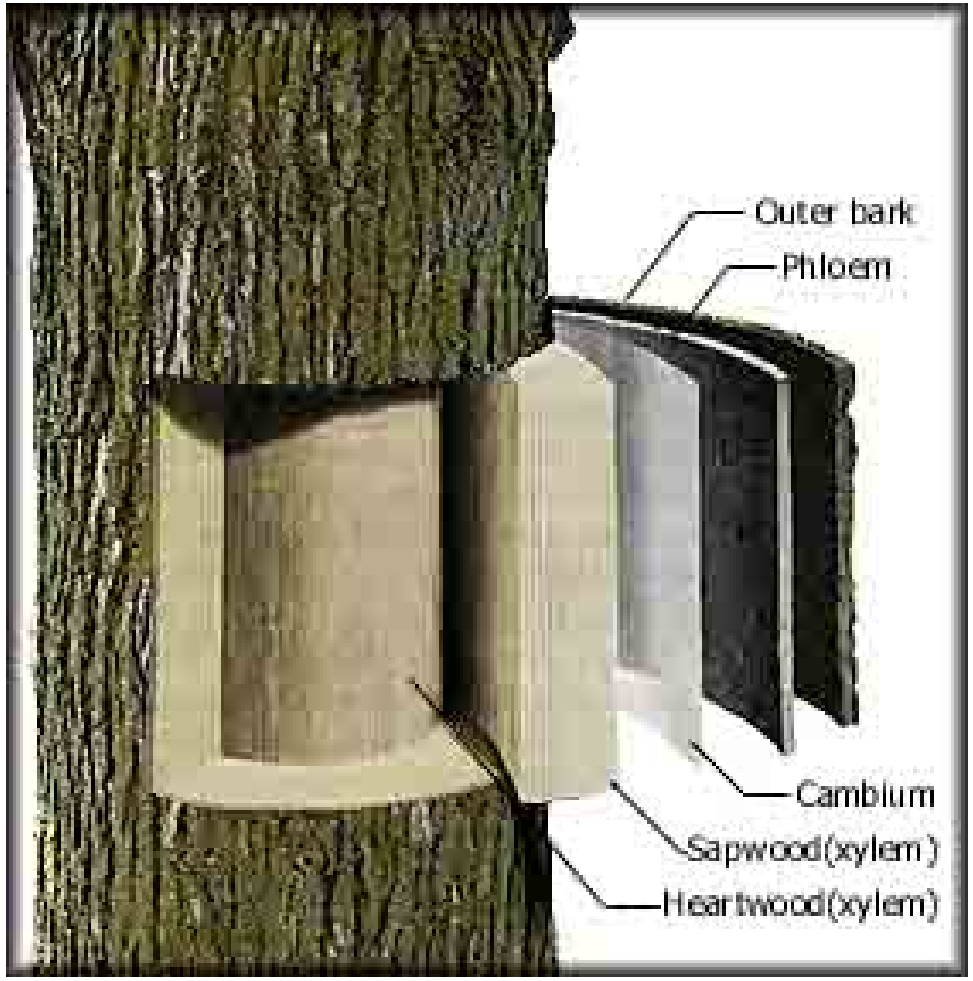
- A “hazard tree” is a tree that has a structural defect that makes it likely to fail in whole or in part. – US Forest Service

Three Things:

- Only a hazard if it has a target
- Focuses on the potential to fail or harm
- An environment that may contribute to that failure

Quick Tree Biology

- Tree root system
- Root functions
- Tree layers:
  - Bark
  - Phloem
  - Cambium
  - Xylem
- Living and dead tissue



CODIT

- Trees don’t heal, they seal.
- Wall 1
  - Stops vertical spread by plugging vascular system (weakest boundary)
- Wall 2
  - Stops inward spread towards the pith
- Wall 3
  - Stops lateral movement by plugging cells (strong boundary)
- Wall 4
  - Separates new wood from decayed wood (strong chemical boundary)

Factors that Influence Tree Hazards

- Defects
  - Proper pruning, cracks, cavities, hollows
- Tree characteristics
  - Species
  - Size and age
  - Maintenance practices
- Tree health
  - But not a gauge of structural integrity

Factors that Influence Tree Hazards

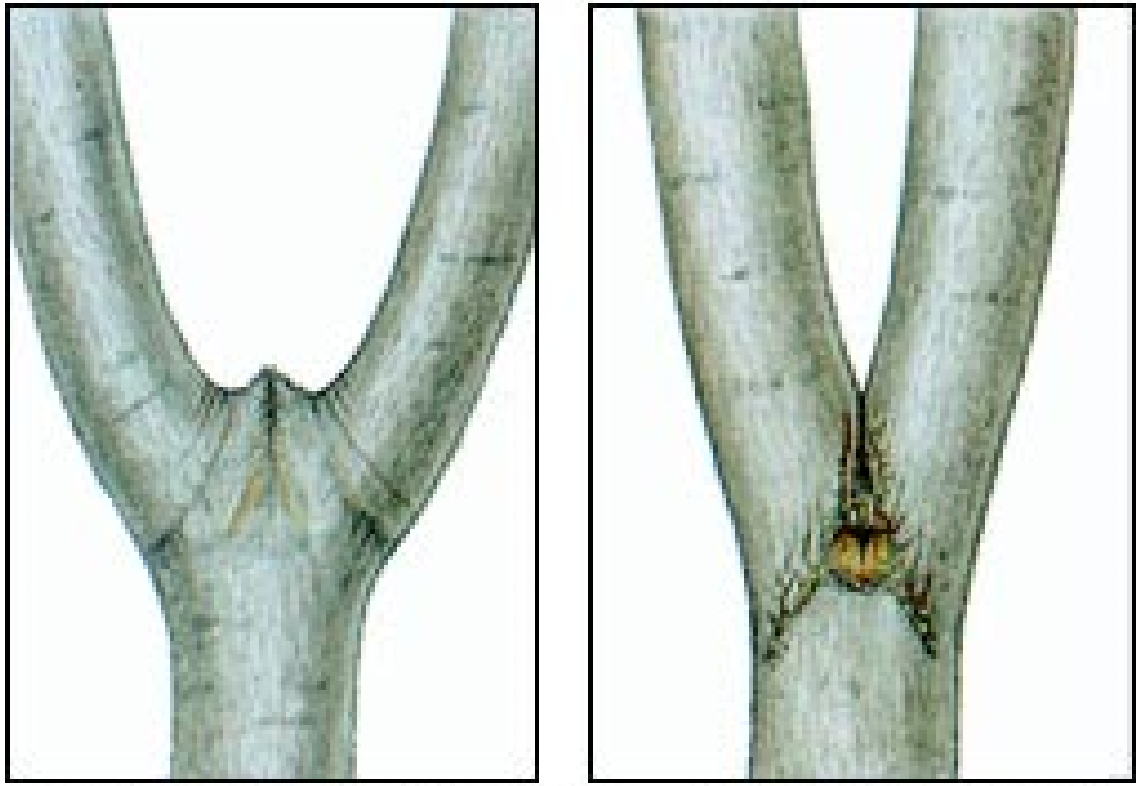
- Site conditions
  - Soil
  - Weather
  - Obstructions
  - Sudden changes of surroundings
- Target
  - High/Medium/Low

Mechanical Design

- Trees grow evenly to distribute stress along the surface
- Physical stress results in active cambium growth
- Reaction wood
  - Tension wood (hardwoods)
  - Compression wood (conifers)

Noninfectious Causes of Tree Failures

- Structure
  - V shaped vs. U shaped crotches
- Root loss/damage/restrictions
  - Purpose of roots and forces endured
- Dead wood
- Mechanical damage
- Leaning trees
  - Reaction wood
- Poor soil conditions



A. U-shaped strong union

B. V-shaped weak union

Figure 3. Types of branch unions

Infectious Causes of Tree Failure

- Decay
  - Conks
- Root/Root collar diseases
- Cankers

Cavities

- Woundwood can increase structural integrity, but is more rigid
- Ram’s horns can develop and cause structural cracks

Root Decay

- Decay is usually advanced before signs are visible
- Root collar inspections should be performed to visually inspect roots
- For trees without other issues, they can only withstand decay in 1/3 of the major roots

Soil Conditions for Root Decay

- Overwatering
- Fill soil
- Soil compaction
- Damaged roots
- Restricted space

Methods for Decay Detection

- Mallet
- Increment borer
- Hand drill
- Resistograph
- Acoustical devices
- X-ray

Hazard Rating

- Failure potential
- Size of the part
- Target rating (High/Medium/Low)

- Will be different for everybody and the amount of risk they're willing to take

Hazard Abatement

- Prune
- Cable/brace
- Remove
- Remove the target

TREE RISK ASSESSMENT: SYSTEMATIC EVALUATION PROCESS

Dr. Kim D. Coder, University of Georgia 1990

ZONE 1: STEM / ROOT BASE (4 feet up and out) -- Bottom four feet of main stem and zone of rapid taper (ZRT) in roots stretching out four feet.
NO COMPROMISE -- NO DOUBT

ZONE 2: MAIN STEM (up to live crown and base of scaffold branches)
ZONE 3: PRIMARY ROOT SUPPORT (out to 1/2 the drip line)
ZONE 4: PRIMARY BRANCH SUPPORT (major branch base area plus the basal 1/3 of their length)

Faults in zones two, three, and four are correctable with large inputs of time, money, materials and technical maintenance. Corrective measures may represent a notification of problems.

ZONE 5: REMAINDER OF WOODY ROOTS (out to 1.5 times the dripline)
ZONE 6: REMAINDER OF CROWN

Zones five and six are not of primary structural concern but any faults still represent significant risks

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Criteria: When three significant simple faults that could lead to catastrophic loss are identified (in zone order), or one significant compound fault that could lead to catastrophic loss is identified, stop and assess targeting aspects of the area, and reexamine site management objectives to determine a hazard designation and removal priority. Examine tree from at least three sides.