

Environmental Biosecurity & Forest Health

An introduction to biosecurity and forest health

Part 3

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Workshop outline

- **Part 1 - Biosecurity overview**
 - Environmental biosecurity priority lists
 - Significance of biosecurity
 - How do things get here
 - Reducing the risk & what happens when they do arrive
- **Part 2 – What are we protecting?**
 - K'gari
- **Part 3 – Forest health & biosecurity**
 - plant pests and pathogens
- **Part 4 – What can I do to help?**
 - Surveillance & reporting
 - Symptoms and signs

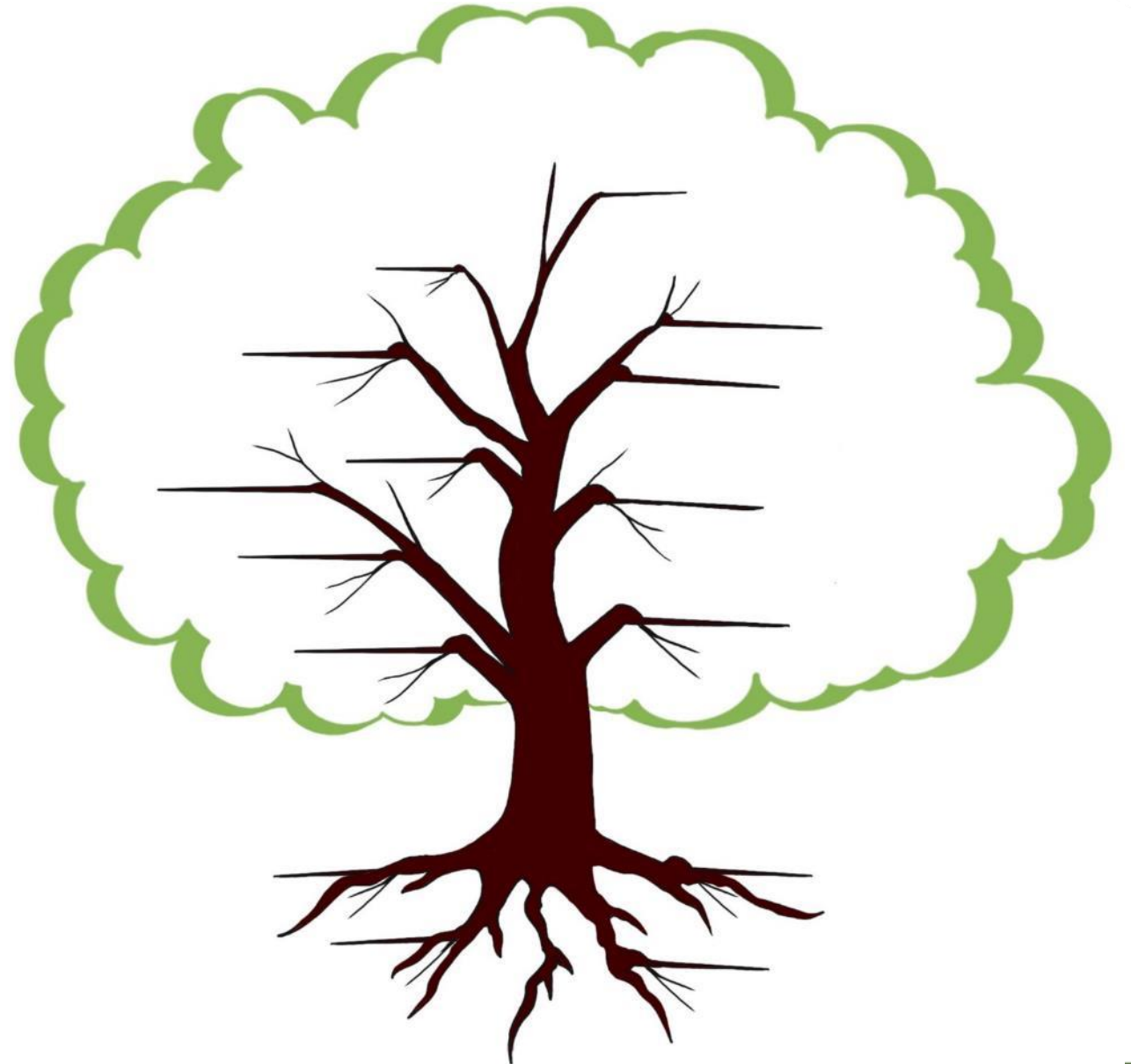


Forest health and Biosecurity – plant pests and diseases



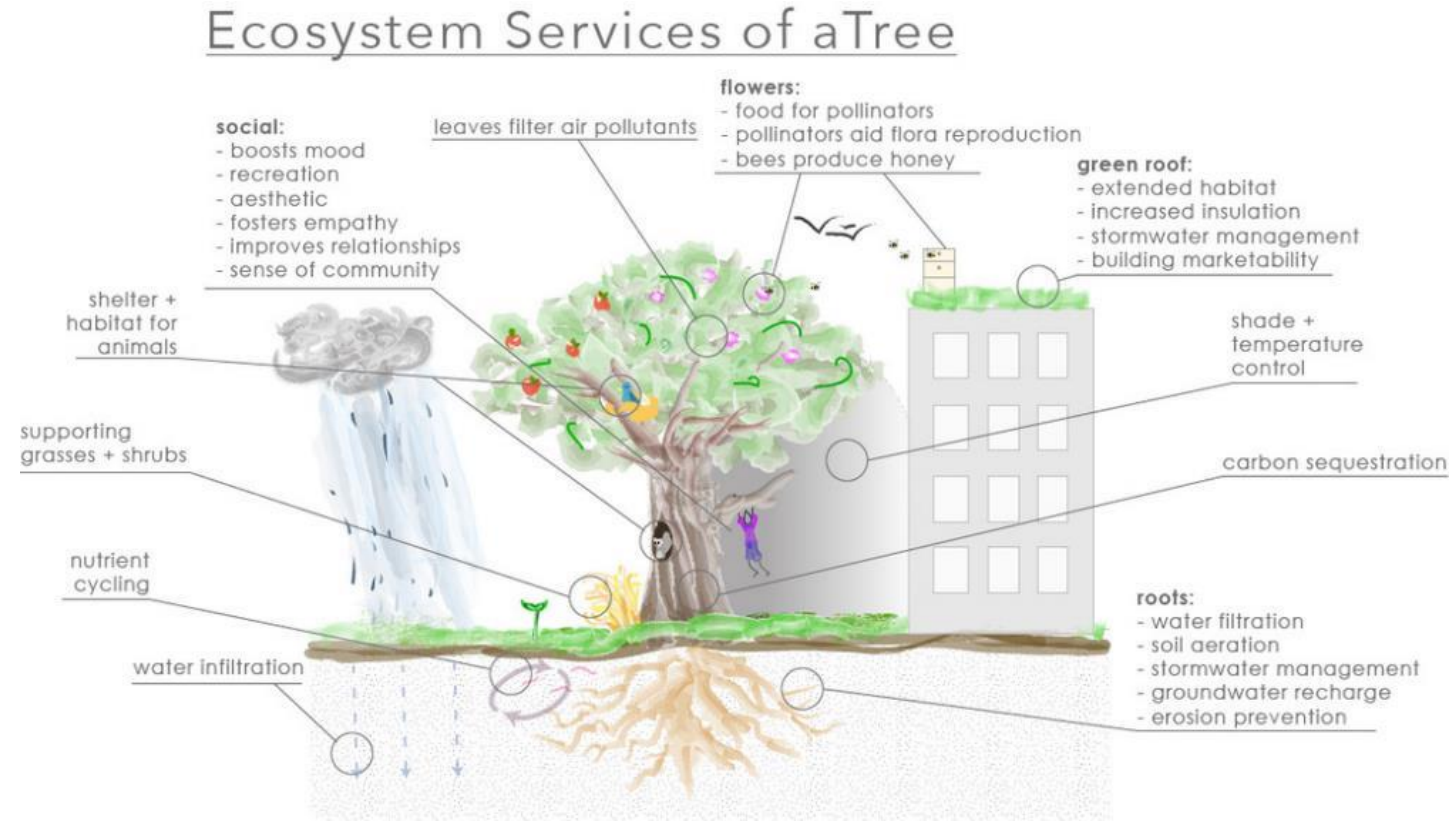
What is a tree?

- Cultural - blue
- Ecological - green
- Social - yellow



What is a tree – ecological/social

- Regulate temperature and provide shade
- Filter air pollutants
- Sequester carbon
- Manage and filter rainwater
- Stabilize soils
- Maintain soil health
- Provide food and shelter for living organisms
- Improve occupant's mental, physical, and well-being
- Improve recreation and aesthetics



What is a tree – cultural importance

- Spiritual
 - Family connections
- Scar trees
 - Navigation
 - Historically significant
- Edible and medicinal
 - Paper bark
 - Pandanus – fertility
 - *Austromyrtus dulcis* – midyim berry



What is a tree – cultural importance

- Canoes
- Shelter
- Cooking
- Indicator – dreaming links
 - Food
 - Festival
- Totems & family connections
- Tools & weapons
 - Spear
- Ceremonial
 - Blue gum
 - Small leaved gum
 - Paper bark
 - Clap sticks
- Weaving





Australian Forests

- 123 million hectares (98%) of native forests and 2 million hectares (2%) of plantation forests
- Due to Australia's geographic isolation we have relatively few of the pests and diseases that affect forests overseas
 - Success of Australian tree species in plantation forests globally has created an increased risk
 - *Eucalyptus*
 - *Myrtle rust*
 - *Acacia*
 - *Ceratocystis wilt disease*



Definitions

- **Forest Health** refers to the status of key ecological and physiological processes of the forest species
 - growth, photosynthesis, respiration, nutrition, water uptake
- In a healthy forest these processes are operating within their normal bounds
- In an unhealthy forest these processes are abnormal and may lead to decline
- Factors influencing forest health include:
 - biotic (e.g. pests and pathogens)
 - abiotic (e.g. nutrients, climatic) agents
 - human activities



Plant pest and pathogen threats to the environment

- **Plant pest and pathogen threats not in Australia**
 - Pests or pathogens that have been identified as a potential significant risk to Australia
 - Have been detected at the border but have not established
- **Plant pests and pathogens in Australia**
 - **Introduced plant pest and/or species**
 - Occurring beyond its natural range
 - **Native plant pests & pathogen**
 - Species occurring naturally in Australia
 - Impacts may change due to disturbance, change in distribution
 - Emerging threat



What happens when pests or pathogens get introduced into a new area?

- Extinction of a plant species
 - Naive hosts – have no or limited inherited resistance to the introduced pests or pathogen
 - No natural checks
 - e.g. biocontrol agents
- Reduced distribution of a plant species
 - Change in population structure
- Reduced ecological function of a plant species
 - Flow on effects – e.g. pollinators
- Loss of culturally significant species/individual trees

Chestnut blight

- ***Cryphonectria parasitica*** – fungal pathogen
 - Native to East Asia and South East Asia
 - Introduced into Europe and North America in the 1900s
 - Affects the American Chestnut and American chinquapin
- **Impact**
- Devastating economic and social impact in eastern United States.
 - Killed an estimated four billion trees & virtually eliminated American chestnut as a canopy species in 8.8 million acres of forest
- Flow on effects the loss of these species had:
 - The chestnut fruit was a major food source for animals in the low elevation Appalachian forests.
 - Drastic decrease of the squirrel population
 - Extinction of seven native moth species
 - Linked to a decrease in the abundance of cavity-nesting birds
 - Decrease in river water quality



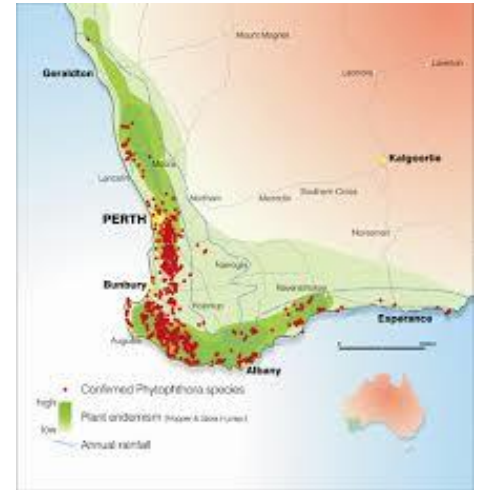
Sudden Oak death

- ***Phytophthora ramorum*** – fungal pathogen
- The disease kills oak and other species of trees
 - devastating effects on the oak populations in California and Oregon
- First reported in 1995
 - introduced as an exotic species to Europe and North America
- **Impacts**
 - Cultural
 - loss of tanoak acorn as one of the most important traditional and ceremonial foods still used in Northern California
 - Yurok, Hupa, Miwok, and Karuk peoples
 - Ecological
 - loss of keystone species



Phytophthora dieback – Western Australia

- *Phytophthora cinnamomi*
 - Kills susceptible plants
 - banksias, jarrah and grass trees, by attacking their root systems
 - More than 40% of Western Australian native plants are susceptible
- > 1 million hectares affected in Western Australia
- Impacts of dieback
 - Loss of biodiversity
 - extinctions of threatened plants
 - extinction of animal species relying susceptible plants for food and habitat
 - dighters, western ground parrots and honey possums.
 - reduced variety of native plants
 - Loss of key understorey species
 - Disruption to woodland vegetation structure
 - The increased dominance of resistant plants such as grasses, rushes and sedges, or introduced weeds



Photos WA Parks and Wildlife - <https://www.dpaw.wa.gov.au/management/pests-diseases/phytophthora-dieback>

Bunya Pine

- Chantel – story from a Butchulla perspective
- Louise – Phytophthora dieback story



Myrtle rust

- Rust fungus *Austropuccinia psidii*
 - Native to South America
 - limited/no impact in native ecosystems
 - Detected in Australia in 2010
 - Host range – Myrtaceae (eucalypts, bottle brush, lilly pilly)
- Impact
 - >350 species from 57 genera – seedlings to 100 year old trees
 - Localised extinction
 - Native guava – *Rhodomyrtus psidioides*
 - Changes in plant community composition
 - Impact on regeneration following disturbance
 - E.g. fire





Myrtle rust on K'gari

- Fire damage sites – southern K'gari
 - Five *Melaleuca quinquenervia* impact monitoring sites assessed
 - High percentage of susceptible trees at all sites
- Seedling regeneration demonstration plot
- Myrtaceae species transect

