PRIMARY TEMPERATE FORESTS

HARBOR UNIQUE BIODIVERSITY AND ECOSYSTEM SERVICES, INCLUDING CLIMATE REGULATION

Carbon

Primary temperate forests sequester and store vast amounts of atmospheric carbon in living and dead biomass and soil organic matter holding on to it for centuries.

- The world's **highest known biomass** (above ground live + dead) of 187 kg/m^2 is in Victorian Mountain Ash forests.
- **Unlogged forests store ~40%-55% more carbon** than logged forests.
- When old forests are cut down, **two-thirds or more of their stored carbon is released** to the atmosphere as a global warming pollutant from combustion and decomposition on-site and emissions from the wood-product manufacturing and distribution chain.
- **Logging emissions are not "offset"** by planting trees or storing carbon in short-lived wood products.
- Large, old trees **sequester carbon at rates 3x** that of smaller trees.
- Large trees (>1 m diameter) contribute **76% of the total biomass** in old-growth forests, but only 43% of tree numbers.
- **Longevity of carbon stocks** determines the degree of climate benefit.
- Trees should be allowed to grow old to **maximize climate, water, and biodiversity benefits**.
- **Clear-cut logging does not mimic wildfire.** Fires do not combust tree boles, and the dead wood generated by fire is longer-lived than 95% of wood products.

Temperate forests are home to 108 Million hectares of remaining primary forest, or 9% of the global total, highlighting the urgency of protecting what's left

Big, Old Trees

Loss of big, old trees is a global concern as fewer of them, and the primary and intact forest landscapes that harbor them, remain due to logging and other threats.

- **Trees can tower to >100 meters** (coast redwood, mountain ash) with a base circumference of >9 meters (giant sequoia, New Zealand Kauri tree).
- **Trees can live for over a thousand years**, continuously accumulating and storing carbon, while helping to regulate the climate through forest-atmospheric feedbacks.
- Dead big trees provide **shade and moisture** for seedlings, **nest sites** for birds and mammals, serve as **biological legacies** jumpstarting forest renewal, and provide cultural and spiritual connections for people.
- **Buffer human communities** from floods and droughts.
- Are **irreplaceable in human lifetimes** and need to be protected from logging.
- Old growth wet temperate forests are **far more resistant to drought and fire** than logged forests.

Biodiversity

Primary wet temperate forests (deciduous, evergreen, broadleaf, conifer, mixed) harbor diverse communities that experience distinct seasonal changes affecting productivity, ecosystem services, and migratory species, especially birds.

- Include both **exceptionally biodiverse and productive older forests and complex early seral forests** created by natural disturbance regimes ranging in frequency and intensity including intense events that kill most of the trees in an area.
- **Lichen richness** is among the highest of any ecosystem.
- Forest carnivore assemblages and **complex food-web dynamics** are fully present and functional.
- **Keystone species**, like anadromous salmon, **connect terrestrial and marine environments** through nutrient cycling of spawned-out salmon carcasses.
- Small mammals feed on below-ground fungi, aiding in spore dispersal of mycorrhizae, allowing plants to **take up nutrients efficiently**.
- **Maintaining biodiversity leads to higher levels of ecosystem integrity and services** such as carbon storage, nutrient cycling, and water filtration and regulation.
- **Temperate forests cover roughly one-third of original extent** vs. 45-65% for tropical and boreal forests, respectively.

Woods Hole Research Center · Wild Heritage · IntAct International Action for Primary Forests · Griffith University · GEOS Institute · Australian Rainforest Conservation Society · Frankfurt Zoological Society