

# The Unique Values of Tropical Rainforests

Planting trees in any climate or location is beneficial for the planet. Temperate forests can sometimes hold more carbon than tropical rainforests because of steady growth over centuries. This is a recent finding of the U.S. National Academy of Sciences.

Overall moist temperate forests store an average of 377 tons of carbon in above-ground biomass (vegetation) per hectare (2.4 acres equals 1 hectare) compared to subtropical moist forests at 294 tons of carbon, and tropical moist forests at 179 tons/hectare.



Trees in the Tropics grow faster and have added benefit over temperate zone trees because they help to cool the planet. This happens because they create a cloud cover which reflects sunlight back into space.

Scientists from the Intergovernmental Panel on Climate Change (IPCC) focus on tropical trees as the key to solving many global environmental and social challenges caused by climate change. When tropical forests reflect sunlight back into space, this is called the albedo effect.

Rainforests are important for biodiversity. Tropical forests cover only twelve percent of Earth's land-area, yet they are home to between 50% and 90% of all the world's species. Because of tropical deforestation, at least one forest species is disappearing every day.

Tropical forests cool the atmosphere because they convert solar energy to water vapor, which increases sky albedo (or reflectivity) via cloud formation.



# The Lungs of the Planet

Tropical forests are like Earth's air conditioner. When it comes to rehabilitating forests to fight global warming, carbon dioxide might be only half of the story. We can also consider how they reflect sunlight by producing clouds, or absorb sunlight by shading snowy tundra. Exactly how much carbon dioxide different types of forests will sequester becomes complex.

Forests in colder, subpolar latitudes evaporate less water and are less effective at producing cloud cover. Trees also tend to be smaller at higher latitudes. As a result, the main climate effect of these forests is to increase the absorption of sunlight, which can overwhelm the cooling effect of carbon storage.

However, the advantage of forest cover is not as beneficial in the Northern hemisphere. Why? Forests in snowy areas can warm the Earth, instead of cool it, because their dark canopy absorbs sunlight that would otherwise be reflected back to space by a bright white covering of snow. Those who live in the tropics can tell you about the cool cloudy days. They can literally feel the action of the forest cover cooling the atmosphere.

California's ancient redwood trees store more carbon dioxide per acre than any other forest in the world, including tropical rain forests like the Amazon. However they take many centuries to achieve full maturity.



Scientists at Humboldt University and the University of Washington find that redwoods store 2,600 tons of carbon per hectare (2.4 acres), more than double the absorption rate of the Pacific Northwest's conifer trees or Australia's eucalyptus forests. The main reason redwoods can surpass all others in CO<sub>2</sub> storage is their longevity. "Their store of carbon is huge," says Dr. Robert Van Pelt, a scientist at Humboldt State University in Arcata, California. "The carbon in a redwood may be more important than the value of the lumber in coming decades."

The average tropical tree adds by sequestration a minimum of at least 50 lbs or 22.6 kg of carbon each year. The size and growth rate of each individual tree coupled with its specific density of biomass determines how much CO<sub>2</sub> is pulled from the atmosphere and stored.

For example, each tree planted with a forest restoration group in Costa Rica found that it sequesters over one ton of CO<sub>2</sub>. Roughly one ton of CO<sub>2</sub> is sequestered per tree over 20 to 25 years. This calculation does not include the additional CO<sub>2</sub> captured in the biomass or fertile topsoil, which is a further beneficial byproduct of long term, high-diversity tropical tree planting.

When considering growth rates of tropical trees versus their northern boreal counterparts, the woody biomass of a tropical trees is significantly denser. Indeed, the majority of trees in the tropics are hardwoods with more than 3500 different species in Guatemala's low lying rainforests.

More than 80% of a tropical tree's woody biomass is sequestered carbon, which is why tropical trees are so important in the fight against global warming and climate change. A further consideration is that tropical trees work 12 months of the year at sequestering carbon because there is no dormant winter season. In contrast, boreal trees work only three or four months of the year. Most tropical hardwoods grow to maturity quickly (within 10 to 30 years), while their boreal counterparts take 80 to over 120 years to achieve the same diameter as a softwood. If you compare a five year old tropical tree to a five year old northern counterpart, anyone can easily see the difference in size.

## A Cornucopia of Fruits and Vegetables

The rainforest's bountiful gifts to the world include fruits like acai berries, avocados, coconuts, figs, grapefruit, bananas, cocona, guavas, palm hearts, limes, papaya, passion fruits, pineapples, pummelos, mangos, star anise plus many more unknown to the outside world but utilized by the Native population. See the maracuya on the right.



There is Aguaje, or the moriche palm fruit, which has a high vitamin C content and is often used to make juice, jam, and even fermented into a fruit wine.



Camu camu, also known as rumberry, grows on bushy riverside trees (see a sample on the right). The fruit is rather tart and sour, somewhat like a wild raspberry, and is often used in juice form. The fruit harvests during the rainy season and is collected by canoe. It has a very high level of vitamin C, between 2 – 3% of its fresh weight, and is extremely popular throughout Latin American rainforest areas.

Cupuazu is related to cacao, and is widely cultivated in damp areas. This fruit has a thick, brown, fuzzy skin (exocarp) and can be large, weighing anywhere from 2 to 3 pounds. The pulp of the fruit is described as tasting like a mixture of chocolate and pineapple, and is often used in desserts, whereas the juice is compared to that of a pear.



At least 3000 fruit species are found in the world's rainforests. Of these, less than 100 are in general use in the Western World. The Indians of the rainforest use over 2,000.



At least 80% of the developed world's food originated in the tropical rainforest. There are an abundance of vegetable varieties too, including many types of corn, chayote, manioc, plantains, okra, potatoes, rice, winter squash, tomatoes, and yams and edible cacti. Rainforest plants are rich in secondary metabolites, particularly alkaloids. Biochemists believe alkaloids protect plants from disease and insect attacks. Many alkaloids from higher plants have proven to be of medicinal value and benefit.

A huge variety of spices exist, only a few of which are found in American or European markets. The most common include allspice, black pepper, cayenne, chocolate, cinnamon, cloves, cumin, ginger, sugar cane, tumeric, and vanilla. The most common include coffee, vanilla, and a variety of nuts including Brazil nuts and cashews.

