

Our Biggest and Best Resource to Mitigate Climate Chaos

By Dan Hemenway January 10, 2024



Clouds embracing Vermont peaks release water to the trees even when it is not raining. By various means, water condenses on the leaves and drips to the ground. Removing water from clouds at high elevations means that less falls as rain, and so flooding is mitigated. Photo by Cassandra Hemenway.

“Vermont”: Translation — “Green Mountains.” Our state’s defining characteristic is expressed in its name. Yet Vermont has a history of early forest abuse. While our recent record is far better, there is much we can do to let our forests mitigate climate chaos and provide a litany of other benefits.

Our state’s ecology still suffers from early settler disregard for the magnificent ‘climax’ forests that they cleared almost entirely for farming. That they farmed until the soil was depleted is well known. Then they moved on. The soil that they ravaged was originally rich in minerals ground from stones by retreating glaciers long before Europeans invaded this continent. Although the forests have struggled to recover, the minerals released by glaciers are long since removed in the food early Vermont farmers exported.

We can help the struggling trees in a number of ways. But, first, consider the reasons why we should.

Water Management

The recent flood would have been considerably more severe had not our forests moderated runoff. Forests and atmosphere interact intricately. At high elevations, low clouds and mists precipitate on tree leaves and drip to the ground, even if there is no rain. Forests increase precipitation cloud moisture as rain, evening rainfall over time. By reducing the clouds' cargo of water, forests reduce the severity of flooding and moderate stream-flow fluctuations. Besides a reduction of runoff from wooded slopes, forests remove nutrients and pollutants that would otherwise contaminate our lakes, rivers, and brooks. They increase groundwater recharge. Worldwide, people observe that when forests are cut, springs falter and dry up.

Other Benefits

Forests clean air and are of immense aesthetic and emotional value to people. They nourish ecosystems and moderate extremes of temperature. Trees can be considered as vertical tanks of thermal mass confined by tissues of cellulose. In winter, air is warmer under forests; in summer, it is cooler. While these temperature benefits are greatest within forests, they exert some temperature stabilization beyond their boundaries. They provide resources for wild crafting, foraging, hunting, recreation, and, through their relationships with water, improve fishing, especially for cold-water species such as trout. Forests remove polluting particles from air.

Carbon Sequestration

Because our forests are young and actively growing, they remove much carbon from the atmosphere. Besides wood, which is often harvested for products and fuel, carbon is stored in roots and in a class of fungi associated with the roots that are nearly ubiquitous wherever forests thrive. The fungi exchange minerals, water, and some kinds of protection against infection for carbon fixed in the tree leaves. Recent studies indicate that the amount of carbon sequestered in these fungi can be immense in undisturbed soil.

Nurturing Forests

Like other plants, trees benefit from informed help. Fortunately, a reported 95% of Vermont's forests have been placed in state-administered management plans. This wonderful start means we already have teams of forest experts in-state. We can do more, and under the pressure of climate chaos and the resulting migration to Vermont, I propose we do.

Forest Know-How

Migration to Vermont is likely to increase, perhaps exponentially. Since most of the state is forested, and communities in the floodplain are already in the wrong place, it will be next to impossible to avoid sacrificing portions of forests for new and relocated homes and new businesses. Forests that are most important should be preserved, perhaps using new tax incentives.

- **Ridgelines.** Where there is relatively level ground on ridges and other more level formations, the economic incentive to clear them for housing or agriculture is great. It is important to retain forests around the edges of these areas to moderate winds and retain forest-water interactions. Not only does a perimeter of forest moderate harsh winds, it is in the best place to intercept mists, reducing the severity of rainfall and recharging ground water, mitigating drought.
- **Steep slopes.** The value of retaining forests on steep slopes is likely evident to most people. They hold soil in place and, again, reduce both flooding and the effects of drought.
- **Unstable soils.** Tree roots are the best insurance against subsidence caused by excessive rain. Information about the relative value of different species for soil stabilization is hard to locate, I've learned. This is one of several topics that could be researched in Vermont's forestry schools.
- **Stream bank ecology.** The value of forest boundaries to rivers and streams is well established, but I've not observed the lessons to be much heeded here.

Thinning

As forests re-establish, as has happened here after the collapse of widespread farming, the succession of individual trees and saplings becomes crowded. Judicious thinning, leaving all wood of little economic value on the ground, stimulates growth of the remaining stand. I've not seen studies of carbon sequestration from increased growth of remaining trees against the release of carbon to the atmosphere from the thinnings.

Obviously, the release is immediate when wood is used for fuel and gradual where wood is left on the ground to return nutrients and organic matter to the forest floor. My personal non-scientific observations are: (1) remaining trees benefit from slash and even entire logs left on the forest floor, and (2) careful, cyclical thinning greatly stimulates growth of the remaining trees, another possible research topic for forestry academia.

Fertilization

Heavy fertilization of forests is likely to be counterproductive and certain to be expensive. However, besides leaving slash on the ground, some other waste products may be candidates for stimulating healthy forest growth.

- **Remineralization.** The fertilizing benefit of finely ground stone is proven. Granite and other native stone is routinely crushed to produce rocks of various useful sizes. The fines, small stone particles, an inevitable byproduct, may greatly stimulate healthy growth. (Simple greenhouse tests growing plants in the relevant forest soil, with various degrees of stone meal added, inexpensively reveal any benefit, and indicate how much added stone dust is optimum.) Ideally, the highest forest slopes would be remineralized first. However, logistics may require first remineralizing lower, more accessible, forests. Remineralization of gardens and farmland is likewise considered beneficial (again, after simple tests). Forest remineralization would be best done before thinning as the composting slash or wood chips activate release of fertility minerals.
- **Sewage sludge.** Sewage sludge and other waste organic matter may improve forest growth without sacrificing forest health. The sludge should first be screened for pollutants and pathogens. Unlike remineralization, which is inherently safe, this practice should be carefully researched and weighed against other use options.
- **Wood ash.** Where wood is used as fuel and the ash is not otherwise used (e.g., to fertilize gardens), forests benefit from a return of minerals removed in firewood.

By actively nurturing our forests, we reduce the extremity and severity of droughts and floods. Aside from energy conversion measures already begun here, perhaps forests represent the biggest contribution we can make that mitigates climate chaos while also improving local climate. And, no small matter, nurturing forests preserves and enhances one of the finest, most stimulating, and lovely characteristics of our state.

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