

Why Keeping Mature Forests Intact Is Key to the Climate Fight

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William Moomaw has had a distinguished career as a physical chemist and environmental scientist, helping found the Center for International Environment and Resource Policy at Tufts University's Fletcher School and serving as lead author on five reports of the Intergovernmental Panel on Climate Change (IPCC). In recent years, Moomaw has turned his attention to working on natural solutions to climate change and has become a leading proponent of what he calls “proforestation” – leaving older and middle-aged forests intact because of their superior carbon-sequestration abilities.

While Moomaw lauds intensifying efforts to plant billions of young trees, he says that preserving existing mature forests will have an even more profound effect on slowing global warming in the coming decades, since immature trees sequester far less CO₂ than older ones. In an interview with *Yale Environment 360*, Moomaw explains the benefits of proforestation, discusses the policy changes that would lead to the preservation of existing forests, and sharply criticizes the recent trend of converting forests in the Southeastern U.S. to wood pellets that can be burned to produce electricity in Europe and elsewhere.



William Moomaw

“The most effective thing that we can do is to allow trees that are already planted, that are already growing, to continue growing to reach their full ecological potential, to store carbon, and develop a forest that has its full complement of environmental services,” said Moomaw. “Cutting trees to burn them is not a way to get there.”

Yale Environment 360: How do you define proforestation?

William Moomaw: So I began looking at some of the data and some of the papers that had come out recently, and I found that if we managed our forests and grasslands in a different way they could be sequestering twice as much carbon dioxide from the atmosphere as they currently do. One paper found in multi-aged forests around the world of all types, that half of the carbon is stored in the largest one-percent diameter trees. So I began thinking about this, and I realized that the most effective thing that we can do is to allow trees that are already planted, that are already growing, to continue growing to reach their ecological potential, to store carbon, and develop a forest that has its full complement of environmental services.

We needed a name for that, so I began thinking about names. I actually sat down and went to Google and searched for prefixes, found a whole bunch of them, and the one that I settled on was pro. Proforestation. It’s not that we shouldn’t do afforestation [planting new trees] and we shouldn’t do reforestation. We should. But recognize that their contribution will be farther in the future, which is important. But in order to meet our climate goals, we have to have greater sequestration by natural systems now. So that entails protecting the carbon stocks that we already have in forests, or at least a large enough fraction of them that they matter. We have to protect wetlands, which are actually storing an amount of carbon in the United States that equals what’s in our standing forests. We need to protect and improve the carbon sequestration by agricultural soils and grazing lands.

It’s taken a very long time for people to focus on something besides reducing emissions of carbon dioxide and other greenhouse gases. And to recognize that even though we’re putting almost 11 billion tons of carbon into the atmosphere every year, the increase is only 4.7 billion tons. So where is the rest going? It’s going into plants on land and plants in the ocean. And the largest single place that’s removing carbon dioxide [from the atmosphere] on an annual basis is forests. Even what we think of as mature forests are still accumulating carbon because carbon makes up about roughly half of the dry weight of wood, but it is also in the soils. Even older forests continue to accumulate carbon in the soils. In fact there are forests where there’s more carbon in the soils than there is in the standing trees. As trees get older, they absorb more carbon every year, and because they are bigger they store more carbon.

“The loss of forest canopy is the greatest in the Southeastern United States of any place on the planet.”

We've seen a lot of interest lately in planting more trees. And planting trees is great and it makes us all feel good and it's a wonderful thing to do and we absolutely should be reforesting areas that have been cut. A recent paper talked about how we could plant more than a trillion trees on nearly a billion hectares of land and how much that would do to solve the problem. These are great things to do, but they will not make much of a difference in the next two or three decades because little trees just don't store much carbon. Letting existing natural forests grow is essential to any climate goal we have.

e360: In terms of CO₂ emissions, we're putting 30 to 35 billion tons of CO₂ from burning fossil fuels into the atmosphere every year, while at the same time there's this dramatic destruction of forests in the Amazon and in Southeast Asia. What we're looking at right now is really a perfect storm for soaring CO₂ emissions.

Moomaw: That's right. But don't leave out the United States. The most disturbed forests in the world are in the United States, not the Amazon and not Indonesia. I don't wish to lessen the significance of the Amazon and Indonesia. But the loss of forest canopy is the greatest in the Southeastern United States of any place on the planet.

e360: Let's talk about what's happening in the Southeastern U.S. and the wood pellet and biomass-burning industry that is driving that deforestation and what can be done about it.

Moomaw: Well, a little over a decade ago, as a result of a rule change in the European Union, they declared bioenergy, like burning wood pellets, to basically be a carbon-neutral and renewable energy source. But bioenergy is more expensive than all the fossil fuels, more expensive than wind and solar, and the industry would not be economically viable without huge subsidies. So the EU, particularly the UK, is giving bioenergy huge subsidies. The UK has reduced their coal use a lot, but their emissions have not been reduced at the same rate as their coal reductions would indicate because a big part of their replacement is from burning wood in the form of wood pellets that primarily come from the Southeastern U.S. The largest coal plant [in the UK], Drax, has converted half of its units to burning wood pellets instead of coal. And there are a bunch of other power plants in the UK that are doing the same thing, and the same thing is happening on the continent. And they claim it's carbon-neutral.



An area of clearcut forest in the Tar-Pamlico River basin in northeastern North Carolina. Dogwood Alliance

The tragedy in the Southeastern U.S. [where large amounts of wood for biomass burning originates] is it's the most biodiversity-rich region in North America and has more species of animals and plants than anyplace else. That is being decimated. For pellets, wetland, hardwood forests are preferable to the pines and the pine plantations, which don't burn as hot, so those wetland hardwood forests are really being gone after. For a long time, the companies made the claim they were only using the residuals, the branches and so on. An NGO down there called Dogwood Alliance documented that that isn't true. They're converting whole trees [into pellets].

e360: What is the solution here, both in the U.S. and in Europe?

Moomaw: As you may recall, [former U.S. EPA administrator] Scott Pruitt made the declaration that all forest bioenergy was carbon-neutral. [U.S. Senator] Susan Collins of Maine actually introduced an amendment, which is still binding, that states that all federal agencies must consider all forest bioenergy from sustainably managed forests to be carbon-neutral. There have been lots of letters by scientists and statements that that is just false.

We'll continue to need and want forestry products — that's understood. But the attitude in much of the forestry industry is that all forests must be managed by principles that improve forests for timber production. But we have to recognize that there's a distinction between industrial production forests and natural forests, and we must make clear that natural forests are managed for biodiversity and the full set of ecosystem services that forests provide. And, by the way, which biodiversity are we shortest of? The biodiversity that's associated with older forests. We hardly have any older forests left in the Lower 48 states. It's in the small single digits of our original forests. The Forest Service says that less than 7 percent of U.S. forests are over 100 years old.

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e360: Talk about the need to expand protections of forests that now have little or no protection.

Moomaw: Except for the designated federal wilderness areas in national forests, the rest of our forests are almost all devoted to timber production. And as you’ve seen, the Trump administration is now going after the roadless areas, as well. We need to have a conversation about which forests are most capable of sequestering carbon in the near term. And those are forests that are generally in the age range of 70 to 125 years — they are the ones that are going to add the most carbon in the coming decades. Unfortunately, 70 years, for many species, is the perfect size for the sawmill. So it is going to mean saying ,well, we’re going to not cut these. This has to apply to federal and state forests. In Connecticut, there is not a single acre of state forest that is not subject to being cut.

e360: And this is New England, the legendary home of reforestation in the last century.

Moomaw: That’s right. And that all happened by benign neglect, which worked out in our favor. The [U.S.] Forest Service has just moved into Massachusetts in an alliance with the state and is creating cooperative organizations that will lead to more cutting of this now very carbon-dense, rich forest that we have in this part of New England. The Department of Energy Resources in Massachusetts has put forth proposed changes and regulations that would increase the amount of forests that qualify for subsidies for bioenergy as a renewable resource, as an alternative energy resource. The outcry from the scientific community, the NGO community, and citizens has been enormous. There’s pressure to build a wood-burning electric power generating station in a low income neighborhood in Springfield, Massachusetts. And that’s being pushed back against very hard by the public. But the governor and his team are pushing forward to make it happen, with more subsidies — subsidies that come from our electric bills. That subsidy doesn’t go to solar panels, it goes to burning wood. We’ve got a real problem here.



A mature forest in the Berkshire Hills in western Massachusetts. Liza Daly/[Flickr](#)

e360: So what policies do you pursue to have a sustainable forest products industry?

Moomaw: I think what you do is you concentrate it on an appropriate set of lands. [Biologist] E.O. Wilson argues that we need “half earth” — that is, half the world needs to be left to nature in order to function. I suppose with one kidney and one lung, we can make it.

One policy that I would suggest is that with privately owned forests and relatively small forest plots, people be paid for the ecosystem services of storing carbon and promoting old-growth biodiversity and the resiliency to climate change that these forests provide. We need to compensate private land owners for leaving their forests standing. Not everybody will do it, but that might get us a mechanism where we get closer to our goal.

The other thing — and there’s legislation proposed here in Massachusetts — is that there be no more timber harvesting on state forest lands. We now have a regulatory system that sets aside about 60 percent of forest lands as either parks or reserves. This would say that the remaining state woodlands would become reserves or parks and not harvested. Well, that would mean that 13 percent of the forests in Massachusetts would not be available for timber. The howling has been unbelievable — “This is the end of the world!” And yet, today, the regulatory system is not controlling this adequately at all.

e360: What about in the Southeastern U.S.? How do you slow down what’s happening with the wood pellet industry?

Moomaw: The best thing of course would be to remove subsidies. That would end it.

| “Wood pellet plants are all being built in low-income, African American communities.”

The other thing is there's a social justice issue here. The plants that make the pellets are all being built in low-income, African American communities that have five times the asthma rate as the state of North Carolina as a whole. These plants produce a tremendous amount of dust and particulate matter. Some of these communities are beginning to fight back. There's a big push down there politically to deal with this. You know, it's really amazing how short-term economic interest can dominate social justice, climate outcomes, everything else. So I think one way is to fight fire with fire and turn the subsidies around. Get rid of the subsidies for bioenergy, begin to support the maintenance of existing forests for private landowners, and really change our policies on state and federal public lands.

e360: Is there any progress in Europe in terms of recognizing that this is not a carbon-neutral source of energy and should not be supported or subsidized?

Moomaw: Yes, there are efforts. There's an organization called [Biofuelwatch](#) in the UK. They are an amazingly well-informed, spunky bunch of activists. The scientific community in Europe is beginning to shift its views on this. It turns out that almost two-thirds of all the renewables used in Europe are bioenergy.

e360: If we do a better job of protecting these older forests, what difference could it make in moderating temperature increases?

Moomaw: If we get to net-zero emissions by 2050 and we continue to reduce our emissions after that, and if we continue to increase the biological sequestration — the nature-based solutions as they're sometimes referred to — we would actually start reducing the amount of carbon dioxide in the atmosphere between 2050 and 2100. The more we can increase the sequestration rate and the faster we can reduce the emissions, the better off we'll be. But cutting trees to burn them is not a way to get there.

This interview has been edited for length and clarity.