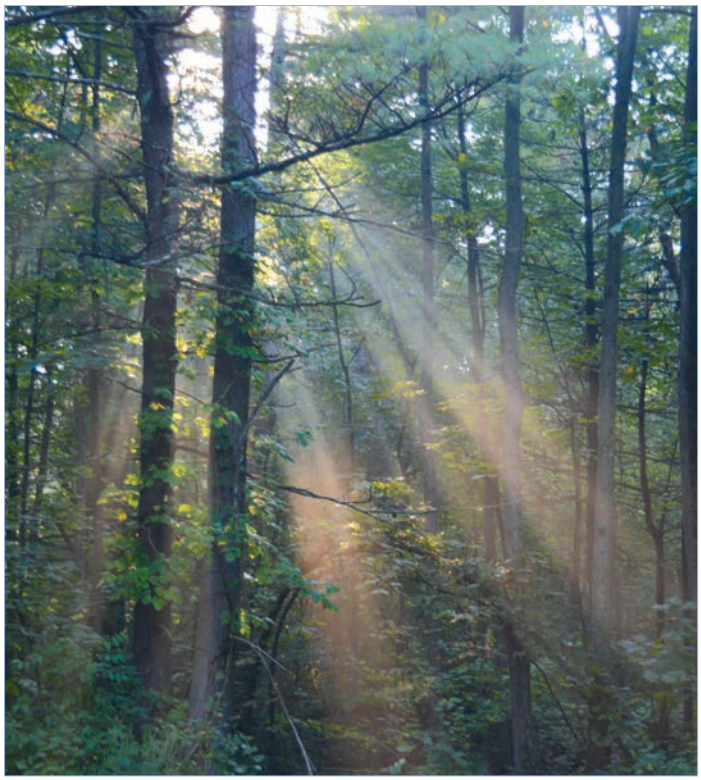
The Critical Role of Forests and Trees in a Climate and Biodiversity Crisis

By Lynne Man



The Massachusetts Chapter of the Sierra Club (MASC) Forest Protection Team's mission is to protect, preserve and expand forests throughout Massachusetts to maximize carbon accumulation, promote biodiversity and optimize human health. An essential part of this MASC working group is to create a shared understanding of the critical role that forests and trees play in mitigating climate change, promoting biodiversity and addressing environmental justice.

The Forest Protection Team interviewed Professor William Moomaw, Professor Emeritus of International Environmental Policy at The Fletcher School of Law and Diplomacy, Tufts University, in September 2021. Professor Moomaw is an internationally recognized researcher and expert on natural solutions to climate change. His focus on increasing carbon dioxide removal and accumulation by forests, wetlands and soils compliments emission reductions from land use changes and forest harvesting, and replacing fossil fuels with zero carbon renewable energy. He has been a lead author of five Intergovernmental Panel on Climate Change (IPCC) Reports and has authored dozens of peer-reviewed scientific articles.

Below are excerpts of this interview, which have been condensed and edited for clarity. We hope that by highlighting the imperative with which forest protection needs to be included as an integral part of climate change mitigation, Professor Moomaw's insights inspire readers to action. Such ideas are woven throughout the interview, including support for legislation (state and federal) on various aspects of forest preservation and carbon capture and storage. At the time of this publication, it is unclear which bills will have been heard in committee and voted on for the current legislative session. To see which bills MASC supports, please visit ***MASC Legislative Priorities.***

Lynne Man (LM), Moderator: We've moved beyond the goal of limiting global temperature rise to 1.5'C. Zero net carbon before 2050 is insufficient to turn us around. Can you explain the importance of forests in carbon capture in relation to fighting climate change?

William Moomaw (WM): Reducing emissions is important as a means to an end, but the goal is to stabilize the amount of CO2 that's in the atmosphere at a level that will avoid exceeding 1.5 - 2 degrees C above pre-industrial global temperatures. The only way we can do that is to transfer atmospheric CO2 to some place else like forests and oceans. Leaving aside oceans for the moment, every year there is 31% less carbon in the atmosphere than we have emitted because of forests. Our forests are taking carbon out of the atmosphere and storing it in wood and in soil. So it is absolutely essential that we find ways of not being just net zero but being zero on emissions and then in addition, having an increase in these removals.

LM: How does land use, including deforestation and wetland and other land degradation contribute to heat trapping gases above and beyond those of fossil fuels?

WM: Dr. Beverly Law, colleagues and I studied how much carbon has been harvested from trees in the three western states, Oregon, Washington and California, from 1900 through 2015. The question is after 115 years, where is that carbon today? Indeed some of it is in long-lived wood products, but that's only 19% of the carbon. Sixteen percent is in landfills and 65% is in the atmosphere as carbon dioxide. Less than half of the wood in those trees would go into boards. The roots wouldn't go in, the branches wouldn't go in, the slab wood on the sides wouldn't go in, the sawdust that came from making it wouldn't go in, and that's more than half the wood.

We need to accumulate more carbon in our natural systems, and half the weight of dry wood is carbon.. It is found that young trees of 50 years, absorb carbon rapidly. This percentage growth slows down as trees age. But the carbon accumulation continues. For example if I cut down a 50 year old tree and replant it, in 50 years, if all goes well, I will have the same amount of carbon in the forest that I had before. If the 50 year-old tree is allowed to keep growing for 50 more years, it will have accumulated more than twice what it had at age 50. Harvesting at age 50 and regrowing is not really progress.

LM: How should policy makers and the public be looking at carbon accumulation by forest soils and other ecosystems? And how does the use of carbon offsets for emissions divert our attention from counting and increasing the impact of natural systems on atmospheric CO2 and biodiversity?

WM: Sustainable forestry means you do not cut more than what grows in a particular year. If the trees were still removing as much as they harvest every year, the carbon would be static. We can't afford static. We have to increase carbon removal rates over emissions rates so that forests remove more than what humans release through harvesting.

Forest carbon offsets were invented by the fossil fuel industry so that they could keep burning fossil fuels. Sure, it's great to be planting trees and replanting after harvesting. But it's not going to remove additional carbon from the atmosphere by 2050. The trees won't become big enough. They won't have absorbed additional carbon. The people in 2080 will love it that we planted trees today, if our climate hasn't changed so badly that they don't grow.

Surveys show that more than half of private landowners would prefer not to cut their forests. Suppose instead we subsidize people to let their trees grow. No questions asked. We'll pay them. That has been tried in places in Brazil and parts of the U.S. and it's working.

So for those of us here in the Northeast, I would argue that's something we should urge our state legislators to enact. It's called "payment for ecosystem services." It's not only to capture and remove carbon. It's for biodiversity, it's for flood control, it's for water quality, it's for air quality. All those are things that we all benefit from. So I think direct payments for services are far better than carbon offsets. We need to account: 1) emissions reductions and 2) removals by nature as two separate actions. Each is necessary and should be credited separately.

LM: Please explain the current system of fossil and forest bioenergy subsidies. What types of policies should be introduced and implemented to transition us to zero carbon renewables?

WM: The goal is to get rid of putting carbon into the atmosphere from any source whatsoever. So policymakers, lobbied by industry, are replacing coal with wood and they're calling it carbon neutral because a tree will regrow. You cut it down and a replacement regrows. If you cut down a 25-year-old tree, it takes 25 years to regrow. A fifty year-old tree takes 50 years. If you cut down a 100-year-old tree, it takes 100 years. Burning wood is subsidized to make electricity because it is more expensive than anything except nuclear power.

When wood is burned, the carbon dioxide goes into the atmosphere instantly. And it takes decades to centuries to replace it. And that doesn't count the fact that in many forests half the carbon per acre is in the soils from all the decomposed leaf litter. Carbon is constantly being put into soils by a living forest. And bacteria in the soil are breaking it down and making soil carbon, and other bacteria are breaking it down and releasing carbon dioxide. As soon as you stop dropping more carbon into soils by cutting down the forests, the rate that carbon dioxide leaves that soil exceeds the amount that is coming in. The soils give an immediate release of carbon dioxide after a harvest. You then lose two ways - from soil respiration and from the loss of tree photosynthetic removal.

LM: Please describe proforestation, and how is this different from afforestation or reforestation? What impact does this have on biodiversity?

WM: Reforestation means to replant a forest that has been previously cut. Afforestation means to plant a forest where a forest is not now growing, and has not grown for a long time or ever.

Currently, many secondary forests are at a prime age to start adding massive amounts of carbon to the trees and to the soils. But there was no term for letting trees grow. So in 2019 some colleagues and I introduced the term "proforestation," to which we gave a precise definition: Proforestation is growing a forest to meet its ecological potential for carbon accumulation and biodiversity.

All those words are carefully chosen. For example, ecological potential refers to the conditions under which the forest grows: the soil, the precipitation, the climate, the temperatures, the species mix, etc. Something like 70-80% of all the biodiversity on land is in forests. We often say we should have forests to protect biodiversity. But I've learned that it's the other way around.

A forest is only a forest if it is biodiverse. Otherwise it's a tree plantation. We may need tree plantations for harvestable resources—houses, paper, furniture, etc.—but it's not really a forest and it doesn't provide the same benefits. The species of trees is part of biodiversity. Probably the most important part of biodiversity in a forest is what is in the soils. Bacteria, viruses and fungi are absolutely essential to the functioning of a forest.

LM: What is meant by forest bio-energy and bio-energy with carbon capture and storage?

WM: Forest bio-energy—This is the idea that we can burn our way to a clean climate because wood burning can replace fossil fuels. People have gotten hung up on the definition of renewables. A forest is renewable, but only slowly over long time periods, and it is not low carbon. Claims that burning wood — forest bio-energy — is carbon neutral is unfortunately entrenched in U.S. law: all federal agencies must count forest bioenergy as carbon neutral if it comes from a sustainably managed forest. We have erroneously legislated science. False science, but nevertheless, it's on the books.

Makers of wood pellets are shipping them to Europe and Great Britain. This is deforesting the southeast U.S., destroying one of the most biodiverse hotspots in North

America. This and other forest management practices have contributed to the loss of one billion forest dependent birds in North America.

Bioenergy with carbon capture and storage or BECCS requires burning trees, capturing the carbon dioxide and storing it underground in a geological formation. To remove sufficient carbon dioxide this way to keep global temperatures from rising by more than 2.7 degrees F (1.5 degrees C) requires creating a tree plantation the size of India. Furthermore the technology to do this at scale does not yet exist, and the early indications are that it is very expensive. It takes an enormous amount of energy to capture the carbon dioxide, and the process is not very effective.

LM: Are these viable options for clean energy?

WM: I do not believe BECCS is economically viable or technologically feasible at scale in the next 30 years. 3 billion dollars have been included in the infrastructure bill for technological approaches to carbon capture and storage. How much funding is there for protecting forests? Zero!. This is a missed opportunity.

LM: How do carbon capture and storage technologies relate to shrinking forests and other natural environments?

WM: I think these technologies are largely a distraction. All of these technologies are hypothetical; they've never been tried before. I'm a very early technology adopter, but these are not technologies that I see as useful. Reducing harvesting and the associated emissions and increasing carbon dioxide removals by natural systems by letting more forests continue to grow is the combination that is really needed.

A study done of Pacific Northwest National Forests found that if one were to reduce harvesting by half and allow the remaining trees to continue growing, 10 times as much carbon would be accumulated from the atmosphere by 2100 as would planting an equivalent number of trees.That is the power of proforestation or letting trees grow while still being able to harvest the other half. I am not saying don't ever cut a tree. But I am saying, if we did this in a smarter way we would be more successful in reducing climate change and producing forestry products. It is far easier and cheaper to set some areas aside that can do the carbon accumulation job that they're doing right now. This has been demonstrated: trees have been around for 300 million years. They have a very good track record.

LM: Are there specific bills in the legislature that people can support that will help protect Massachusetts forests? Also is there federal legislation that we should be paying attention to?

WM: Yes. In the state legislature, there are two bills. H.912 would remove commercial harvesting from state forest lands, and H.1002 would set aside some lands in our state wildlife areas. You've probably heard of "30 by 30" — set aside 30% of the land and 30% of the oceans for protection by 2030. Also, we need to get rid of all bioenergy subsidies in Massachusetts, as well as our subsidies to bioenergy plants in Maine and New Hampshire. We've been paying these subsidies to out-of-state bioenergy plants because we don't have many here. The bioenergy plant proposed for Springfield has been put on indefinite hold for a number of reasons, including environmental justice. These facilities are most often located in environmental justice communities — some combination of poor people and people of color. Legislation at the federal level is not as far advanced as I would like. It's all focusing on technological solutions instead of protecting the natural systems that are already doing an effective job. I think that's a problem.

LM: There is a growing conflict between expanding solar energy generation and keeping forests intact throughout Massachusetts. How do we advocate against this?

WM: It's easy to argue against bioenergy. You get so little energy from burning wood, that protecting trees is clearly a better choice in carbon terms. Deforesting an area for solar panels means an on-going loss of carbon accumulation by the forest. There are plenty of other places for solar panels that leave forests standing, so we can have zero carbon electricity plus additional atmospheric carbon removal by the undisturbed forest.

A Clark University study pointed out that half of land conversions in Massachusetts have been for solar panels -- not for urban development, not for agriculture, not for highways. An informal study was done in Berkshire County where 37 solar arrays were put in place and just over half of those involved cutting forests. No one seems to have looked at what this means for additional flooding from intense precipitation. No one's looked at what this means for biodiversity. No one's looked at connectivity for wildlife and plant migration as the climate warms. We have fabulous connectivity in corridors going from Western Massachusetts and Western Connecticut going all the way down into NY state, and all the way up into Canada. These need to be maintained for adaptation to climate change.

The other thing that people don't fully understand and appreciate is that deforestation does not count emissions that are coming from soils which is often equal to what is lost in trees after a cutting. Developers don't count the actual area cut for solar panels, which is, on average, 3-4 times more than the area of the panels themselves to ensure the panels are not shaded.. In addition, the roadway that goes out with the transmission lines requires even more cutting.

Also, when trees get to be really big, they store an enormous amount of carbon. If we're not going to let them get really big because we cut them to install solar panels, they will never achieve the long term accumulation of carbon that would occur in a forests of big trees and lots of soil carbon if left standing. So it's a false trade-off in my view.

LM: This has been very informative! Thank you so very much for sharing with us, Professor Moomaw!

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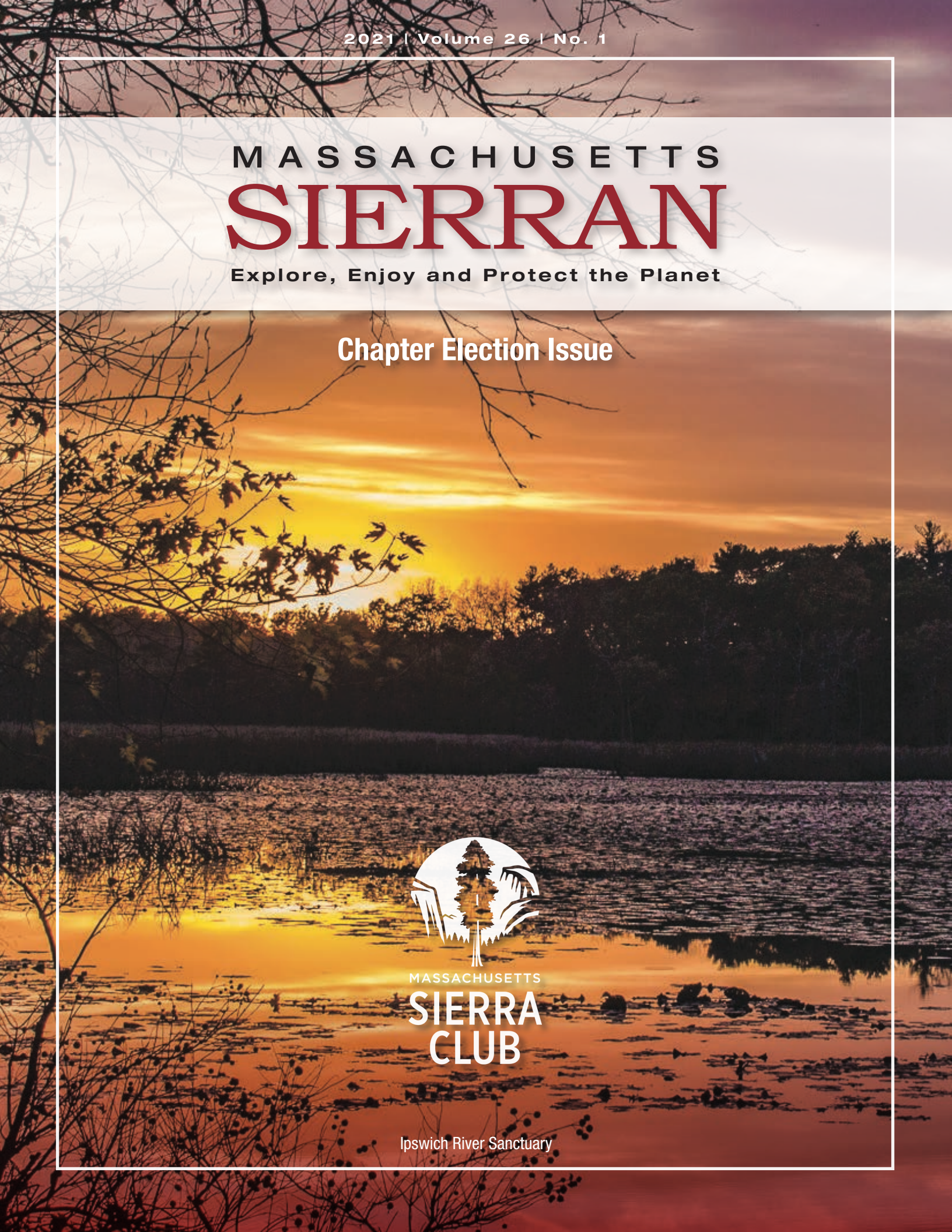

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