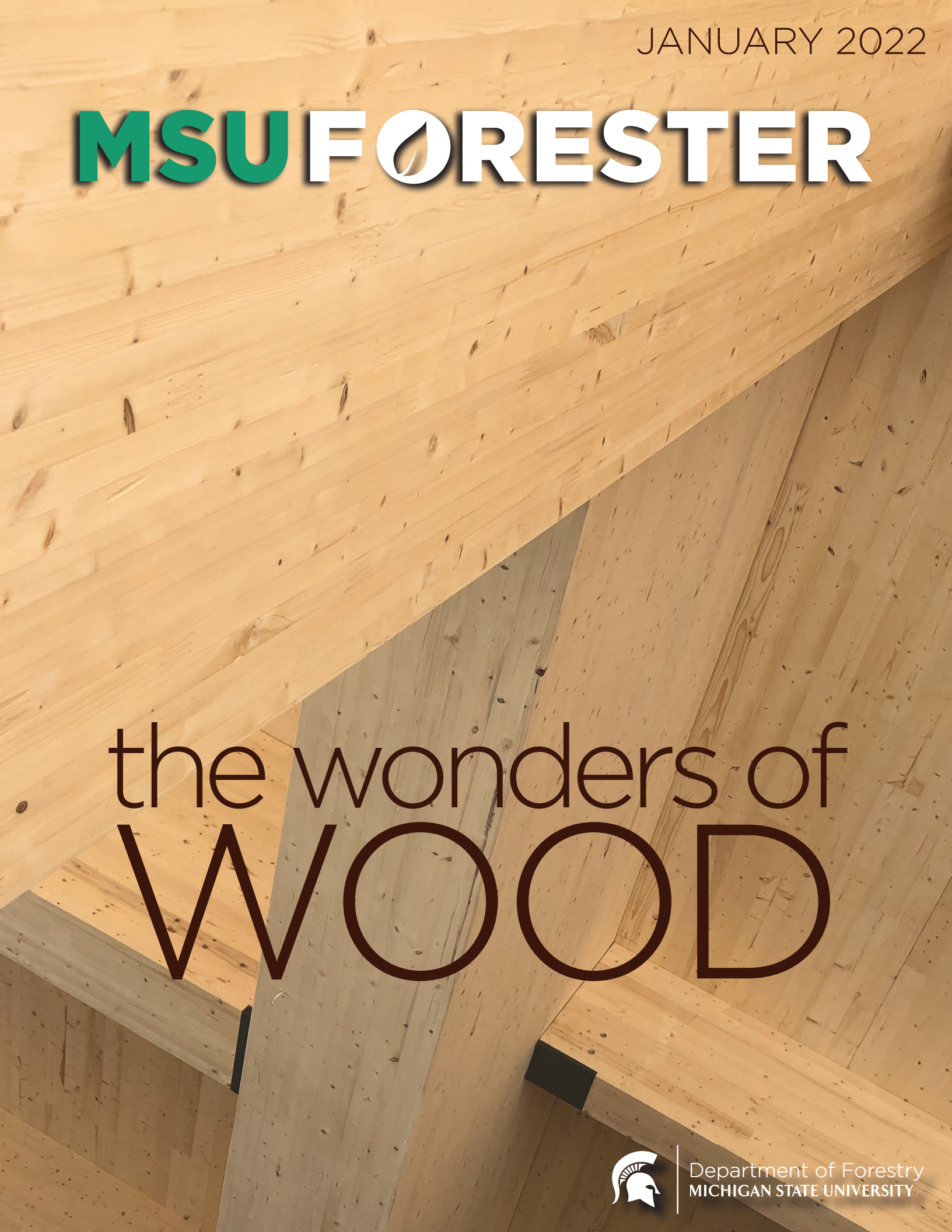
JANUARY 2022

MSU FORESTER



the wonders of WOOD

Department of Forestry
MICHIGAN STATE UNIVERSITY

IN THIS ISSUE

Front cover: Mass timber in the STEM Teaching and Learning Facility
Back cover: wood discs in the MSU Shadows wood shop

A NOTE FROM THE DEPARTMENT CHAIR

Dear MSU Forestry Alumni and Friends,

Like many of you, I love wood as much as I love trees. At home, most of our floors are white oak planks. Our coffee table is an alligator juniper slab, a reminder of sabbatical in northern Arizona. In the Department of Forestry's space in the Natural Resources Building, whenever feasible, we use furniture constructed from wood recovered from campus trees (see MSUShadows.com). The color variation and complex grain patterns of wood convey a warmth that is hard to match. Perhaps this perception of 'warmth' arises from biophilia –the innate human instinct to connect with nature and natural elements.

Not only does wood largely comprise our house and its furnishings, it also keeps us warm in Michigan's cold winter months. From my view, there is no better warmth than a wood-burning stove. As fire is essentially the reverse of photosynthesis, I like to think of the flames in our woodstove as the release of stored sun from a warm summer day.

This issue of the MSU Forester is focused on several programs in MSU Forestry centered on the wonders of wood. As a building material, wood provides incredible strength for its weight, a property arising from the evolutionary pressure for trees to grow taller and shade, rather than be shaded by, their neighbors. These structural properties of wood are well suited for mid-rise buildings, like the mass-timber STEM Facility on MSU's campus, the first building in Michigan incorporating cross-laminated timber (see page 9). In collaboration with MSU Extension and School of Planning, Design, and Construction, our MassTimber@MSU (masstimber.msu.edu) program is extensively engaging with the building sector, including owners, developers, architects, and constructors.

The molecular constituents of wood, such as lignin, also hold tremendous promise as a feedstock for sustainable and bio-based products (see page 6). Scientists in MSU Forestry are researching lignin properties and its use in manufacturing foams (for example, car seats), adhesives, and coatings (https://www.canr.msu.edu/news/using-lignin-as-a-sustainable-alternative-in-biobased-adhesives).

Because 50% of wood (by weight) is carbon taken up from the atmosphere, storing carbon in durable wood products also could be an important strategy to mitigate climate change, a focal point of our Forest Carbon and Climate Program (canr.msu.edu/fccp).

We also recently initiated a new minor in Sustainable Bioproducts Science and Technology (https://www.canr.msu.edu/news/department-of-forestry-now-offers-a-minor-in-sustainable-bioproducts-science-and-technology), educating a new generation of professionals for the wood products industry.

With rising consumer demand for more sustainable bio-based products and wood-based construction (especially mass timber), and with the climate and carbon benefits of wood compared with other materials, it's a wonderful time to be involved in wood products.

The wonders of wood! I hope that you enjoy this issue's focus on the various ways that MSU Forestry is elevating wood to be even more wonderful.
Go green!

Rich

ALUMNI UPDATES

TOM BERRY | BS ‘67
I retired from wholesale lumber trading in 2016. Previously, I worked as a procurement forester in northern Michigan and then in economic development with the forest industry in the Lake States. I have recently moved to Watertown, SD to be nearer to family and better fishing opportunities. We spend our winters in Arizona. I have been active in SAF and for many years have been on the board of South Dakota Project Learning Tree.

KEN FREYE | MS ‘76
We closed our company, Dirigo Partners, LTD., in April of this year due to health issues with my business partner. I agreed to continue to help our primary client part-time on a major project with the goal of being completely retired in early 2022.

My wife, Cheryl, and I have enjoyed the free time to hike, bike and travel with two trips to California to visit my son and family and a three-day family Rim-to-Rim hike of the Grand Canyon. At 71 I’m not the oldest to do the hike but our daughter-in-law was a few weeks pregnant so there may be a claim for the youngest hiker. I also spent some time bird hunting with my setter, Chloe Belle, this fall and continue to shoot sporting clays competitively, having achieved the ‘AA’ classification.

CHARLES CHESNEY | BS ‘77
I have completed the fourth ecological monitoring mission in the Ahtanum Basin of Washington over 20 years. At five-year intervals since 2006, I have safely solo worked/walked/waded 15 miles of the stream channel network for PESSCA (performance evaluation of a stream channel condition assessment) to check, and evaluate, the validity of my long ago interpretations of channel sensitivity to inputs of water, wood, sediment, heat, and perturbation.

Next, a contest for valid channel wood models from evidence-based practice. For contestants, sponsors, or ideas, contact me. Thanks to Dr. Alan Sliker (wood technology) for greatness.

BRIAN OSWALD I BS ‘79
Brian Oswald, Joe C. Denman Distinguished Professor of Forestry at Stephen F. Austin State University, was named the Dwight Patterson Alumnus of the year by the Northern Arizona University Alumni Association in October, 2021. Brian received his MS in forestry at NAU in 1981.

TIM BARDEN | BS ‘80, MS ‘83, MBA ‘84
Tim graduated in 1980 with a BS in Forestry, 1983 with an MS in Forest Business Management and 1984 with an MBA in Materials and Logistics Management. After graduation, he spent over 37 years with the Department of the Navy, Navy Exchange Service Command before retiring in 2021 as a Branch Director for Contracting.


Snowy day near the MSU Pavilion

IN MEMORIAM

Those we lost in 2021

LARRY BULOCK
1941 - 2021
Larry Kenneth Bulock, age 79 of Manistee passed away on Thursday Jan. 21, 2021 at his home. He was born on March 26, 1941 in Indianapolis, IN, son of the late Vern C. and Helen M. (Benjamin) Bulock. After high school, Larry attended Michigan State University and graduated in 1965 with a Bachelor of Science degree in Forestry. He was employed at Packaging Corporation of America as a forester for 18 years. He left PCA in 1983 to open his own consulting forestry business, Michitree, with his wife Janet. He also served as a mentor in the Big Brothers/Big Sisters program of Northern Michigan. Online: legcy.co/3HF7u4K

GERALD LOWRY
1928-2021
Gerry was born September 12, 1928, to Mildred and Mony Lowry, in Harrisburg, PA. and fell in love with trees and nature soon afterward. During and after service in the U.S. Army, Gerry pursued an education in Forestry. He earned degrees from Penn State, Oregon State and a PhD from Michigan State. In 1972, after 10 years of work for the Pulp and Paper Research Institute of Canada, he moved from Montreal, Quebec to take a teaching position at Stephen F. Austin State University. Gerry found his calling and remained at SFA for almost 30 years, retiring as a full professor.

DAVID CLELAND
1950 - 2021
David “Dave” Thomas Cleland, 71, died Wednesday, May 19, 2021 after battling Leukemia and Lymphoma. David was born in Detroit, Michigan on March 10th, 1950. After completing his high school studies, he attended Michigan State University where he met his wife, Cathy, in 1972 and acquired a Bachelor’s degree in Soil Science. He began working for the US Forest Service in 1978 and continued his employment there where he not so quietly moved up the chain of command until his last position as a National Vegetation Ecologist working out of the Washington Office. In 1985 he began working towards his PhD from Michigan State University which he successfully completed in 1997 in Forest Ecology, Soils, Silviculture and Quantitative Methods. Online: legcy.co/34szA50

DR. ALBERT MAKANGA MWANGI
1958-2021
The late Albert Makanga Mwangi was born in Mugaa-ini, Othaya, Nyeri in 1958. Albert attended the University of Nairobi from 1979-1983 where he attained a Bachelor of Science degree in Forestry. In 1986, he attained a Master’s Degree in Resource Economics and Management from Michigan State University. In 1992, he graduated with a PhD in Resource Economics from Michigan State University on a Fulbright Scholarship. Albert had an illustrious career in the field of conservation and natural resources, and earned many awards and accomplishments in his area of expertise over the years.

IVAN BORTON
1925-2021
Ivan Glenn Borton, 96, went to his heavenly home on September 25, 2021. Ivan is a World War II veteran who served in the United States Navy. Following his service he married Dorothy Brooks (1926-2008) in 1947, together they raised 6 children. He worked for MSU for 42 years as a mechanical technician. Ivan served as a reverend to the Deaf community mainly at Lake Lansing Baptist in East Lansing. He also volunteered for the boys brigade and at Camp Barakel. Online: bit.ly/33ayg5T

RICHARD VERNON “DICK” JONES
1941 - 2021
Richard V. Jones, age 80 of Suffield passed away peacefully at his home after a prolonged illness on Wednesday, September 29, 2021. Dick was a 1959 graduate of Tallmadge High School, and received his Bachelors in Forestry at Michigan State University, class of ‘64. He was District Executive for the Boy Scouts of America Great Trail Council from 1966 until 1979. Dick retired in 2007 from Davey Tree, Kent, OH, having held several positions over his 25 years of service. Online: bit.ly/31wt0sY

THE STATE OF SUSTAINABLE BIOPRODUCTS

Lignin-based rigid foam for insulation applications, created by Christián Henry in Dr. Nejad's lab at MSU

With the environmental effects of climate change becoming increasingly clear, the need for carbon neutral or carbon negative buildings has become greater than ever, and the forest products industry is seeing a great movement toward the production and use of sustainable wood products.

"When we are talking about sustainable raw materials, nothing can compete with forest products," said Mojgan Nejad, Green Bioproducts Assistant Professor in the Department of Forestry at MSU.

The construction industry has seen a consistent increase in products like mass timber (see page 9) replacing concrete and steel, which require higher energy for production. Using wood products in buildings allows those buildings to sequester carbon for 50-60+ years after construction.

Nejad's lab uses lignin, an underutilized portion of biomass, generated as byproduct during production of pulp and bioethanol, to develop sustainable bioproducts. Nejad's lab has developed bio-based adhesives by replacing 100% of petroleum-based phenol and polyol with lignin to formulate lignin-based phenolic adhesives for plywood application and lignin-based polyurethane (PU) adhesives for cross-laminated timber (CLT).

Nejad is leading a consortium of six industry partners – Roseburg, West Fraser, Fortum, Hexion, Henkel and Element 5 – and has received funding ($500,000 CAD) from CRIBE (Center for Research and Innovation in the Bio-Economy, Canada) to scale up the development of lignin-based phenolic (Hexion), and lignin-based PU (Henkel). These bio-based adhesives produced by Hexion and Henkel will be tested on the manufacturing lines of Roseburg (plywood) and Element 5 (CLT) by 2023.

This is a great era for forest product industries to encourage architects and construction managers to build with mass timber and use bio-based adhesives to improve the sustainability of their products.

While wood scientists are excited about multi-story wooden buildings, they are also working hard to encourage CLT producers to use preservative-treated wood for certain areas. It is imperative to protect wood from decay fungi and termites in contact-ground applications or when building in a warm, humid area like Florida.

"As a wood scientist, I believe that this is an excellent direction that the construction industry is going, but we need to do our part to educate CLT producers, architects and construction managers on proper practices," said Nejad.

For instance, cross laminated timber (CLT) made with untreated wood is not protected from decay fungi, insects and weathering (UV and rain). Thus, buildings must be designed in a way to prevent the uncoated CLTs from exposure to direct UV and rain, and ensure they are protected by preservative solutions in areas susceptible to termite damage.

Using sustainable wood products in the construction process is a positive trend that can have major implications towards the goal of carbon neutral or carbon negative buildings in development, but it is a trend that must be monitored and carefully executed to ensure the quality and longevity of the materials being used.

A NOTE FROM THE FAA PRESIDENT

Good day fellow foresters! I hope you have been able to spend a little more time with family and friends during this Holiday season. My family and I were able to enjoy some Holiday festivities with a few larger groups this year; it was so great to see everyone!

With 2021 in the books my family and I look forward to the possibilities that 2022 will bring. My oldest will finish kindergarten and start first grade, while my youngest enters preschool; oh my, how time flies! It is so much fun watching my girls bring projects home and talk about the exciting new things they experienced and learned at school. My oldest was so proud when she was able to educate her peers on the day they talked about chickens, pigs, and gardening! That's right up her alley and she couldn't wait to tell me what she knew and what she taught her class!

I like to think, and hope that I express such excitement for new information and experiences like my daughters do. It's a fun experiment to look at 'adult' size problems and wonder how a 6-year-old might feel about them. Often, I am pleasantly surprised on how openminded my kids are and how their simple tactics can sometimes be pretty helpful and shed a different light on a situation.

I am personally excited to see what MSU Forestry will dive into this year. The new Mass Timber building is being fully utilized and talked about on an expansive stage. Carbon and Climate education continues to grow and present new opportunities for current and future students. The new Hybrid Online MS Degree is the first of its kind and will hopefully open so many doors for people to enter into and experience the Forestry community. I'd invite you to visit the MSU Forestry website and check out the information about these exciting developments within the Forestry Department.

If you get a chance, please visit the MSU Forestry Alumni page, update your contact information and check out other volunteer opportunities presented on the form. If you have any questions about becoming a mentor, becoming an alumni ambassador, hosting a student intern, participating in the MSU Global Day of Service, or how to get involved with the Alumni Association, please don't hesitate to reach out to us! I truly hope that you continue to find happiness and good health in 2022!

Your friend,
Jason Darling
BS 2008
President, MSU Forestry Alumni Association
Owner – Darling Forestry, LLC
Jason@DarlingForestry.com

REMEMBERING THE PROFESSOR THAT CHANGED YOUR LIFE

Dick Barry, BS 1959, received a letter once from Wood Products and Processing professor Dr. Aubrey Wylie that changed his life. After being discouraged in academia at Colorado State University, Dick sent letters all over the country, unsure of what to pursue next. He received only one response.

Dr. Wylie became an important influence throughout Dick's time at MSU after he took a leap of faith to move to East Lansing, and he remembers him fondly. With no prior knowledge of wood products or processing, Dick learned that it was actually a perfect fit for him.

"When I received Dr. Wylie's letter, I had no idea what wood processing was, but it was very appealing. On pure blind faith, I moved to Michigan," Dick said.

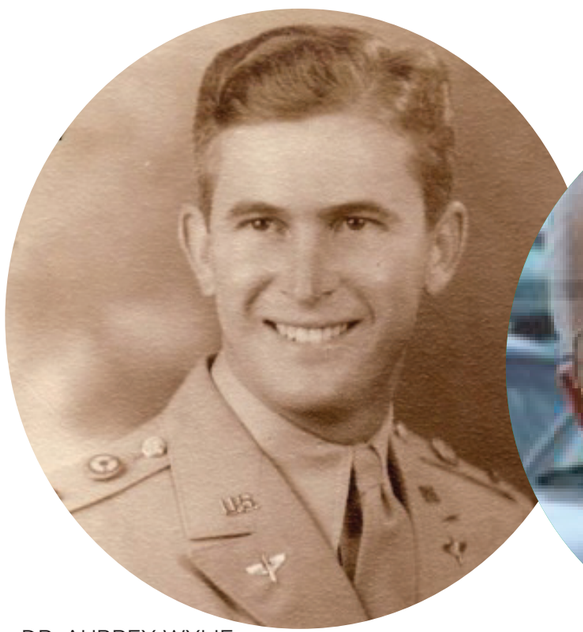
Dr. Wylie attended Magnolia A&M College, Colorado State University, and earned his doctorate from the College of Forestry, SUNY, Syracuse in 1950. Dr. Wylie taught at MSU from 1956 to 1968, mainly focusing on quality control and production management for wood processing industries and research in wood conversion.

Wylie also worked for the United States Department of Agriculture throughout the 1970s and as an advisor at Yezin Forestry Institute in Myanmar from 1980 to 1983.
Wylie was a forester by profession and a sculptor by avocation. His home is graced by hundreds of his small, hand-carved art pieces. Wylie passed away May 13, 2010.

Upon graduation in 1959, Dick accepted a job assisting Warren A. Wood in building a sawmill in Golden, BC, also known as Kicking Horse Forest Products. Dick credits Dr. Wylie's teaching of 'Statistical Quality Control' for enabling him to later become a Quality Control Supervisor at the Novoply plant near Redding, California. Having a firm understanding of the technical side of the business, Dick eventually became a field problem solver in the furniture, dinette and sink deck industries.

Dr. Wylie influenced the course of Dick's life and charted a path for a successful and rewarding career, and for that, he is forever grateful.

Did you have a professor that changed your life? We want to hear about it! Contact us at lnoel@msu.edu to share your story.



DR. AUBREY WYLIE

DICK BARRY

MASSTIMBER@MSU

SANDRA LUPIEN
DIRECTOR, MASS TIMBER@MSU

Michigan's first mass timber building – the MSU STEM Teaching and Learning Facility – opened its doors in early July of 2021. Great timing from my perspective – I had just joined the University as the first Director of MassTimber@MSU, a new program that harnesses outreach, engagement, research, and education in support of efforts to advance sustainable mass timber construction in the Great Lakes State and the surrounding region. MSU's STEM building serves as a beautiful living laboratory for those interested in mass timber construction.

I love providing tours of the facility to show off how the mass timber structure works; to share planning and construction insights gleaned by MSU and the project team as the first mass timber building in our state; and to enable people to experience the unique happy feeling of being in a large wood building.

HOW DO WE USE MASS TIMBER IN BUILDING CONSTRUCTION?

People are using mass timber in a variety of ways – in small buildings to contain boilers, in single-family homes, in art installations – but the most powerful way to harness mass timber's benefits is by using it in large buildings that would normally rely on steel and concrete to create the building's structural system.

Mass timber's properties – strength, fire resistance, and lighter weight – make it a compelling substitute for steel and concrete in many buildings. Some buildings use mass timber – usually a combination of glue-laminated timber (glulam) and cross-laminated timber (CLT) – to form the entire structural system. More frequently, we see mass timber in combination with steel and concrete. In the MSU STEM facility, you'll see a hybrid structural system featuring exposed glulam columns, beams, and girders with steel fasteners and cross-bracing, as well as CLT ceilings and CLT walls in the stair towers.

This hybrid model demonstrates the flexibility of working with mass timber and results in a design that is both warm and airy, with an aesthetic that blends natural materials and natural light with an industrial look that melds the site's history as a coal-fired power plant with its current use as a dynamic environment for STEM learning and innovation that will help create a bright future.

WHY DOES USING MASS TIMBER MATTER FOR SUSTAINABILITY?

Reducing significantly the emission of greenhouse gases (GHGs), like carbon dioxide (CO_2), that hasten climate change is a key priority worldwide, including in Michigan. In 2015, buildings and the construction industry (manufacturing building materials like steel, concrete, and glass) accounted for nearly 40 percent of global carbon dioxide (CO_2) emissions (28 and 11 percent, respectively). So, choosing building materials that help keep CO_2 out of the atmosphere is an important part of any strategy to tackle climate change. Mass timber has an important role to play for several reasons.

First, mass timber is made from wood – a renewable resource – in contrast to steel and concrete, the basis of which consist of finite mined material.

Second, mass timber typically has a lower embodied carbon footprint than steel or concrete. In other words, it takes less energy and emits less CO_2 to produce. Steel and concrete both require very large amounts of – typically fossil fuel – energy to mine, manufacture, and transport. Mass timber, which is lighter-weight and less processed, typically uses less energy for harvesting and milling lumber, operating a press, and transporting materials from forests to manufacturers to building sites. Increasing energy efficiency, using renewable energy sources, sourcing mass timber from nearby manufacturers all further reduce the carbon footprint.

Finally, mass timber materials actually store significant volumes of carbon. As trees grow in forests, they absorb CO_2 from the atmosphere and store it as carbon in their branches, leaves, trunks, and roots. If a tree decomposes or burns, much of its carbon releases into the atmosphere. Long-lived wood products, such as furniture and dimensional lumber used for stick framing, store much of the trees' carbon, keeping it out of the atmosphere as long as the products remain in use.

That's why mass timber buildings, which can stand for decades or centuries, are particularly powerful carbon storage solutions. For example, the 3,000 cubic meters of glulam and CLT in the MSU STEM facility store 1,856 metric tons of carbon dioxide equivalents – that's like not driving the average vehicle about five-million miles or not burning more than two-million pounds of coal. And when the mass timber's wood comes from sustainably managed forests, like the Forest Stewardship Council (FSC)-certified Black Spruce in the STEM building, we're ensuring that the forests themselves maintain their carbon-absorbing-and-storing functions.

We're proud that the **FSC recognized MSU in 2021 with a Leadership Award** for its use of sustainable mass timber in the STEM facility. As more MSU students, faculty, and visitors reap the benefits of teaching, learning, and meeting in the first mass timber building in the state, I look forward to expanded collaboration with stakeholders and I encourage you to visit the MSU STEM Teaching and Learning Facility in 2022 to see for yourself what the buzz is about.

NEW FACES IN THE DEPARTMENT

KYLIE CLAY
Associate Director, US and Canada Lead, Forest Carbon & Climate Program

Kylie Clay is the Associate Director, US and Canada Lead, for the FCCP team. Her favorite outdoor activities are hiking and picnicking. Kylie's favorite place in the world is the Acadia National Park, both for the forests and the lobster. She got her Ph.D. in Political Science from the University of Washington with a focus on the political economy of natural resource governance and her MSc in Political Economy and Political Science, London School of Economics. Kylie has her BA in Political Science and French, from the University of Michigan.

CHRIS FERNANDEZ
Research Associate

Dr. Chris Fernandez is a soil microbial ecologist that is interested in understanding the influence of microbes on soil biogeochemical cycles in a changing world. He is particularly interested in mycorrhizal fungi, which are a group of symbiotic fungi that colonize the roots of most plants and provide nutrients in exchange for carbon, and how they influence carbon and nitrogen cycles in forest ecosystems. Currently, he is working with Aki Koyama and Andy Vander Yacht investigating the influence of plant-soil feedback on oak regeneration success in red pine plantations across Michigan.

SANDRA LUPIEN
Director, MassTimber@MSU

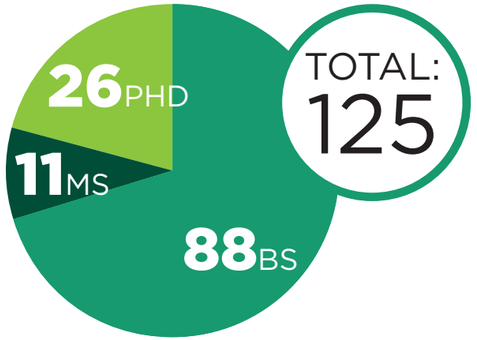
Sandra has diverse experience in the non-profit and public sectors with a particular focus on climate and environmental policy, communication, and engagement. In 2018, she completed a mid-career Master of Public Policy at the University of California, Berkeley; her thesis focused on removing barriers to the manufacture and adoption of cross-laminated timber in California in order to fund increased forest management to achieve forest health and resilience goals while storing forest carbon in the built environment. Sandra was born and raised in Michigan and is excited to reconnect with the Mitten after spending time on the East Coast and the past 20 years in California.

CRISTINA BARBER
Research Associate

Dr. Cristina Barber Alvarez-Buylla (professionally Cristina Barber) is a tropical forest ecologist. Her main interests are tree demography and ecological modeling. She recently finished her Ph.D., and is now a research associate with Dr. Richard Kobe. In the past, she has worked on creating predictive maps of tree recruitment and finding drivers of adult tree survival in agricultural landscapes using remote sensing and field data. Now for her postdoc, she will be working on understanding the effects of climate on tree demography in Costa Rica using a long-term database of 20 years. She is incredibly excited about the opportunity to work with such a fantastic data set!

2021 YEAR IN REVIEW

ENROLLMENT



STUDENTS IN MINORS

15 FORESTRY

23 URBAN & COMMUNITY FORESTRY

2 SUSTAINABLE BIOPRODUCTS SCIENCE & TECHNOLOGY

FUNDING

$4,268,715.66 RESEARCH FUNDING

ANNUAL GIFTS FROM ALUMNI & SPONSORS **$299,938**

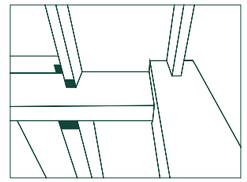
DONOR BREAKDOWN

70 <$100	**4** $1,000-2,499
96 $100-499	**1** $2,500-4,999
17 $500-999	**4** $10,000+

TOTAL: **195** GIFTS FROM **117** DONORS

ACCOMPLISHMENTS

STEM TEACHING AND LEARNING FACILITY FEATURING MASS TIMBER WON **FOREST STEWARDSHIP COUNCIL AWARD**



MSU RANKED IN TOP 10 GLOBALLY IN AGRICULTURE & FORESTRY (QS WORLD UNIV. RANKINGS)

41% OF TENURE-STREAM FACULTY IN **TOP 2%** OF SCHOLARS IN THEIR FIELD (PLOS BIOLOGY)

42

STUDENTS IN THE FOREST CARBON GRADUATE CERTIFICATE PROGRAM

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