

FALL 2019

M | SEAS

Stewards

A MAGAZINE FOR ALUMNI AND FRIENDS OF THE SCHOOL FOR ENVIRONMENT AND SUSTAINABILITY

HONORING

OUR

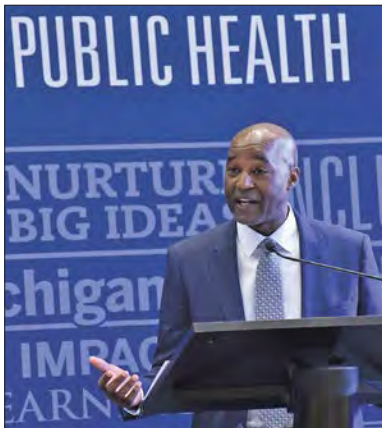
PAST

Special Issue:

SEAS PAST & FUTURE



DEAR FRIENDS:



Fifty years ago, the New York Times said Michigan's Teach-In on the Environment had been "by any reckoning . . . one of the most extraordinary 'happenings' ever to hit the great American heartland: Four solid days of soul-searching, by thousands of people, young and old, about ecological exigencies confronting the human race."

The Teach-In provided the blueprint and the momentum for thousands of other activities and events across the country that made up the first Earth Day just a few weeks later on April 22, 1970. It also propelled a new movement of environmental consciousness and action.

In the spirit of the Teach-In's deeply interdisciplinary week of activities, we are writing this letter together, coming together across disciplines as we reflect on the past and rise to the challenges of the future. Now is a critical time to build a large tent, include diverse perspectives, and work toward improving conditions for the natural environment, its effect on human health, equity and justice.

We are both relatively new to our roles as deans, drawn to Michigan for its commitment to research, teaching, and impact, as well as its interdisciplinary approach to tackling the world's biggest challenges. Our schools, the School of Public Health and the School for Environment and Sustainability, are part of a university-led initiative committed to scholarship and engagement surrounding Earth Day at 50, and we are privileged to be in our roles. The initiative involves collaboration between a number of schools and programs across the university and community groups across the region—because climate change is an issue that impacts all of us and cannot be solved by any one discipline alone.

Throughout this issue of *Stewards*, you will learn more about the many partnerships that enrich this work across sustainability, health, engineering, business, public policy, and many other disciplines.

“ We are committed to strengthening the relationship between our two schools not only because it is Earth Day’s fiftieth anniversary but because, through our combined expertise and efforts, we believe we can contribute significantly to the health and sustainability of generations to come. ”

As an inhabitant of the Earth, you are part of the solution, and this is the time to rise to the challenge.

Dean Jonathan Overpeck,
School for Environment and Sustainability

Dean F. DuBois Bowman,
School of Public Health

Stewards

A magazine for alumni and friends of the School for Environment and Sustainability

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Printer
University Lithoprinters, Ann Arbor
Printed using soy-based inks on paper that
contains post-consumer waste fiber

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YOU'RE INVITED! ALUMNI AND FRIENDS ARE WELCOME AND ENCOURAGED TO PARTICIPATE IN THESE AND OTHER COMMUNITY EVENTS

FEBRUARY 13

*Michigan Environmental Justice Summit 2020
Commemorating the 30th anniversary of Michigan's
Conference on Race and the Environment & Looking
Towards the Future*



MARCH 12

*Earth Day 50th Anniversary Celebration
18th Annual Peter M. Wege Lecture on Sustainability
Hill Auditorium*



APRIL 1-3

2020 New Horizons in Conservation Conference



FULL SCHEDULE OF EVENTS @
seas.umich.edu/events



I hope you will enjoy reading “Honoring Our Past.” It is a story of excellence and evolution beginning with the establishment of the Forestry Department at the University of Michigan in 1903, and continuing to the current School for the Environment and Sustainability established in 2017.

Throughout the document it is clear to see that conservation leaders at the school—from Filibert Roth in 1903 to Samuel Trask Dana in the 1930s and 40s—recognized the need to continually evolve and change the curriculum reflecting advances in science and changing societal values. During the first 24 years of the 20th century, the focus was on forestry. During the next two decades, academic programs were based on the concept of conservation. From 1950 until 1992, there was a further evolution to reflect the demand for education on the management of all natural resources. Based on the world-wide environmental movement and the need for research and education on all elements of our global ecosystem, the school specifically added “environment” to its name. And then in 2017, SEAS began its current exploration of social, economic, and environmental sustainability.

As you will see while reading through the history, each period of change had within it very special people who made outstanding contributions through research and teaching. Most importantly, they made a real difference in the lives of their students.

My own love of the school and my interest in working on this project began with my father. George Banzhaf graduated under Filibert Roth in 1922. His stories about “Daddy” Roth and the confidence he instilled in my father made a difference in my own life. Forty-five years hence I graduated from SNR in 1967. Although there were a number of professors who made a real difference in my education, my own memories go back to John Carow, Frank Murray, Bob Gregory, and Fred Knight. These men had a very special way of connecting with students. They were listeners who provided both academic and personal advice.

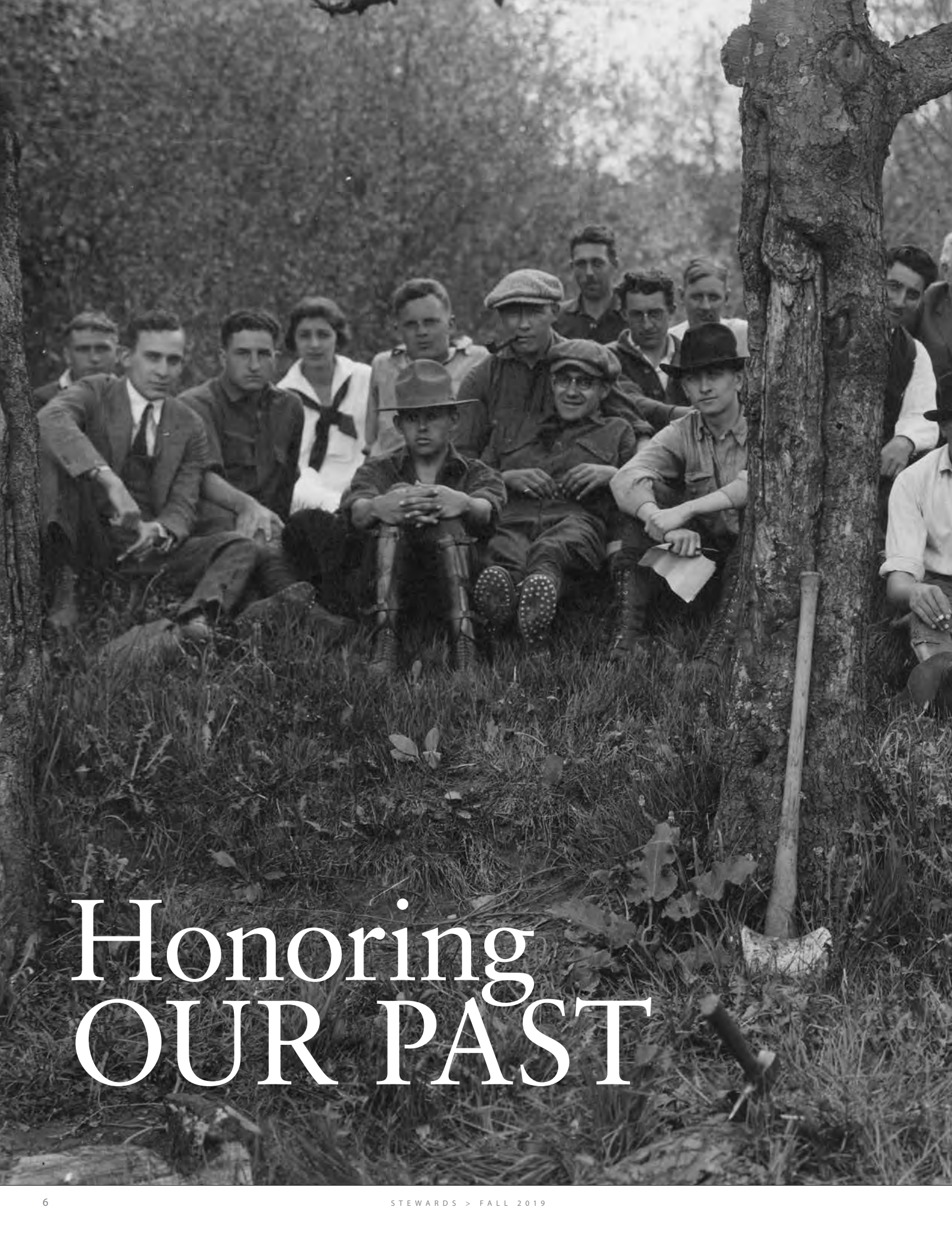
As you walk through this history, each of you will find the names of the men and women who made a real difference in your life. Some of these people will be your professors; others may very well be your fellow students. Finally, what I most appreciate about this project is that this history illustrates our common ground. It brings us together with the belief and sense of pride that whether we graduated in 1922, 1967, or 2019, we all received the education we needed to face the issues of the day.

Go Blue,
Bill Banzhaf, class of 1967



GEORGE BANZHAF (BSF '22)

Upon graduation from the U-M Department of Forestry in 1922, George Banzhaf began his career in the Upper Peninsula of Michigan. Through his work for the Great Lakes Forest Survey, he formed a partnership with Russell Watson, a U-M professor of forestry, which led to the creation of the first independent forestry consulting business in the Lake States. The primary focus of the business was to bring science-based forest management to private lands. From 1950 until his death in 1987, Banzhaf developed sustainable wood supply programs for pulp and paper facilities around the country.



Honoring OUR PAST



FIELD DAY AT SAGINAW FOREST, 1909
Wearing his signature bow tie and suit jacket, Professor Filibert Roth (center right) takes a moment from the day's teaching to be photographed with the faculty, students, and staff of his beloved Department of Forestry.



THE DEPARTMENT OF FORESTRY

When the University of Michigan was founded in 1817, a vast forest of white pine carpeted swaths of Michigan's lower and upper peninsulas, trees often reaching heights of 200 feet. Within a few decades, rivers like the Saginaw were choked with timber bound for the sawmills—as the nation's demand for lumber outgrew its supply.

By 1903, the great white pine forests of Michigan had been cut over and left as wastelands. Now burdened with a tinderbox of abandoned tree tops on soil unsuitable for farming, landowners often chose to surrender their "stump prairies" to the state rather than pay delinquent taxes.

In Michigan, and throughout the country, there was a call for leadership in the restoration of these deforested lands. There was little time to waste in addressing the state of the nation's forests.

U-M responded to the call by establishing a Department of Forestry, chaired by Filibert Roth (MS 1890). Roth had studied forestry under Volney Morgan Spalding, the U-M botany professor who had established the nation's first courses in forestry in 1881.

Under Roth's direction, the curriculum and faculty rapidly expanded to keep pace with developments in the forestry profession. And while Roth fully embraced the emerging science of forestry, he also believed that the best place to learn forestry was in the forest—and led his students on regular excursions into Saginaw Woods, U-M's 80-acre reserve, to plant trees and improve the soil.

As this new breed of "science-based" foresters moved into positions of influence, Roth came closer to his dream of bringing responsible forest management to Michigan, as well as to the country as a whole.

Roth's vision—and the department he led for 20 years—embodied the core values that would define the future school throughout the 20th century and into the next: an education rooted in science, reinforced by field-based learning, and driven by a commitment to the public good.



FILIBERT ROTH (MS 1890)

Born in Württemberg, Germany, in 1858, Roth was the son of a German father and a Swiss mother. The family emigrated to Wisconsin when Roth was 12. After graduating from U-M in 1890, Roth was known as a leading expert in the new field of "timber physics." He served in top positions at the U.S. Departments of Agriculture and the Interior before beginning his role (1903 -1923) as chair of U-M's Department of Forestry. Much beloved by his students for his down-to-earth manner and heartfelt encouragement, he earned the moniker of "Daddy Roth."

Great Lakes Forest Survey

The forestry department was about more than teaching. Practical application of the knowledge and training generated from the department made a real difference in the management of forests on a statewide and national level. One example occurred in 1922, when Roth and Department of Forestry Professor Robert Craig assembled a team, including George Banzhaf, to survey and assess management alternatives on over 250,000 acres in the Upper Peninsula of Michigan. The Michigan graduates who worked on this massive project learned their field skills at Camp Davis, now the U-M Biological Station, located on Douglas Lake near Pellston, Mich. The Great Lakes Forest Survey was the first attempt in the United States to assess the suitability of cut-over land for forest and agricultural management. Based on the importance of this effort, the governor of Michigan established one of the first statewide forest fire protection plans.

Fast Facts

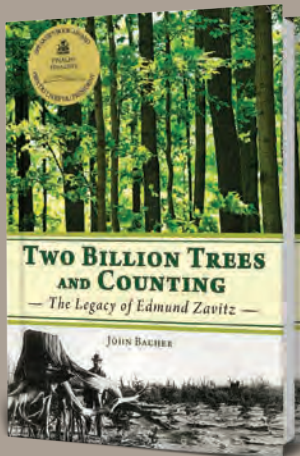
In the Saginaw Valley in the winter of 1875, between 7,000 and 8,000 men were employed as lumbermen in the forests. In 1890, there were 1,957 sawmills in Michigan. By 1897, over 160 billion board feet were logged from Michigan forests.





Edmund Zavitz (MS 1905) “Father of Reforestation”

As one of the earliest alumni of the newly established Department of Forestry, Edmund Zavitz became the first provincial forester in his native Ontario, eventually rising to the positions of Deputy Minister and Chief of Reforestation. Photographs from his travels throughout the province revealed a desert-like landscape, and supported his crusade for reforestation and conservation. Through his efforts, conservation authorities, provincial nurseries, forestry stations, and bylaws protecting trees were established. The Forest Fires Prevention Act and the inception of the provincial air service are also attributed to Zavitz. Just before his death in 1968, the billionth tree was planted by Ontario Premier John Robarts—with two billion to follow. *“Two Billion Trees and Counting: The Legacy of Edmund Zavitz”* was published in 2011.



FORESTERS FORM A PACK TRAIN ON WAY TO CAMP, 1912

“In accordance with its desire and aim to be of the utmost service to Michigan, the University is strengthening its work in training men in the science and art of forestry. One of the gravest economic problems in our state is presented by the desirableness of restoring, if possible, the forests which have been destroyed and of properly caring for the woodlands which are still left.”

- James Angell, President, U-M, 1903



1881: First Courses in Forestry

VOLNEY MORGAN SPALDING established the first full-semester course in forestry in the nation within the School of Political Science at the University of Michigan in 1881. Spalding later encouraged his former pupil, Filibert Roth, to lead the newly formed Department of Forestry in 1903.

Forestry Facts

1904 The Department of Forestry conferred one of the first Master of Science in forestry degrees.

1908 Interdisciplinary coursework was established with the Engineering department so that the students could combine their expertise with the profession of forestry.

1912 A five-year program was created in order to confer a Bachelor of Science in Forestry in four years and Master of Science in Forestry in the fifth year.

1927-1949



Dr. Samuel Trask Dana, painted for the Weyerhaeuser Timber Company by Stan Galli



**SAMUEL A.
GRAHAM**

Samuel A. Graham served as a professor at SEAS for multiple decades (1927-1961), and is regarded as a pioneer in what is now called “environmental sustainability.” In the 1940s and 1950s, before many environmental issues were generally recognized, Graham published articles on the environmental consequences of dichloro diphenyl trichloroethane (DDT) overuse and the threat of long-term water-table problems. His son, U-M alumnus Donald C. Graham, is a long-time supporter of SEAS, and founded the U-M Graham Sustainability Institute in 2007 in honor of his father.

“The word ‘conservation’ was added to the name of the school to indicate that its interpretation of forestry is much broader than the ordinary conception, and to emphasize the fact that in addition to the training of professional foresters, one of its important functions is to teach the philosophy of conservation as the fundamental basis of permanent national prosperity.”

— Samuel T. Dana, Michigan Alumnus, May 11, 1929

THE SCHOOL OF FORESTRY AND CONSERVATION

Always on the leading edge of education, the University of Michigan identified the need to broaden the curriculum in the Department of Forestry.

As plans to expand the department coalesced in the months leading up to 1927, a man named Samuel Trask Dana was offered the position of chair of the Department of Forestry. A long-time forestry specialist in the U.S. Forest Service, both before and after serving as a U.S. Army Captain in World War I, Dana held the position of forest commissioner in his home state of Maine. He accepted the U-M position, but with the condition that the department become the School of Forestry. The U-M Board of Regents approved, and made the significant addition of “conservation” to its name—making it the first school of its kind in the nation, and Dana its first dean.

Dana’s leadership would invigorate the new school for the next two decades—through the economic and environmental crisis of the Great Depression and the devastating upheaval of World War II.

Dana would later propose sweeping changes in the final years of his tenure, surpassing the recommendations of a committee of conservationists tasked with the school’s reorganization. Dana’s plan ushered in a new era that recognized both the value and broader scope of the nation’s natural resources. A new name for the school, along with a new mission, would soon follow.

THE GREAT DEPRESSION AND THE CIVILIAN CONSERVATION CORPS

The Great Depression was the focus of the 1930s. In 1933, in response to the rising unemployment in the country, President Franklin D. Roosevelt established the Civilian Conservation Corps (CCC). The CCC was designed to provide unskilled manual labor jobs related to the conservation and development of natural resources in rural lands owned by federal, state, and local governments. There were a number of CCC camps located in Michigan, Wisconsin, and Minnesota. Much of the cut-over and burned over land surveyed by Michigan foresters in the 1920s was restored during the CCC days from 1934 to 1942. The School of Forestry and Conservation provided much of the leadership and expertise needed to direct the men doing the CCC restoration work.

WORLD WAR II

The war years from 1942 to 1945 saw an understandable reduction in students. However, the need for forest products to support the war effort resulted in the increased need for foresters to ensure that the harvesting of forests was managed on a sustainable basis. Many of the foresters called upon were Michigan graduates. In support of the war, an accelerated program was offered in 1942. This new program allowed students to register at the School of Forestry and Conservation directly from high school, and gave young men a basic training in forestry subjects that would be of direct value to them in either the military or civilian activities connected to the war. After the war, the increased demand for housing to provide homes for returning veterans resulted in a similar increase in the demand for professional foresters and other natural resource managers.

THE CRAIGHEAD BROTHERS MS '40, PhD '49

Frank and John Craighead, twin brothers, were American conservationists, naturalists, and researchers who made important contributions to the study of falconry and grizzly bear biology. In 1998, the Audubon Society named the twins among the top 100 figures in conservation of the 20th century.



THE BROTHERS TRACKED GRIZZLY BEARS WITH RADIO COLLARS IN THE 1950s AND '60s, AND WERE EVEN EARLY USERS OF SATELLITE DATA. THEY DISCOVERED JUST HOW FAR BEARS ROAMED BEYOND THE BORDERS OF YELLOWSTONE— DATA WHICH HAD A BIG IMPACT ON HOW THE PARK IS MANAGED FOR CONSERVATION.



A TIMELESS MOMENT IN SAGINAW FOREST

SAGINAW FOREST

1904

A tract of 80 acres on Liberty Road, about three miles west of Ann Arbor, was accepted as a gift from Regent Arthur Hill of Saginaw.

1906

Saginaw Forest was the site of the first annual Campfire, beginning a tradition which continues to this day. Portions of the land formerly used for farming had poor soil condition, so students and faculty improved the soil and planted trees, continuing that work until 1937.

Containing several tree species, Third Sister Lake, and surrounding wetlands, Saginaw Forest lends itself well to the study of forest and sustainable ecosystem management, and serves as a setting for research on diverse topics, including woody plants, forest ecology, freshwater ecology, and soil properties and processes.

NOTES FROM THE FIELD

More than a century ago, when Filibert Roth led his students—hefting spades and armloads of saplings—into Saginaw Forest, he instilled a tradition of field-based learning that remains vibrant at SEAS today. Throughout the decades, students have navigated the land, forests, lakes, and rivers—first as students of nature, and then, as stewards of the environment.

Over time, the “field” has broadened in scope. From the midwestern heartland of Michigan to far flung regions around the globe, from sustainable landscape design in Detroit to a negotiating table in D.C., SEAS students and alumni bring their energy, expertise, and hands-on approach to solve real-world problems.

CAMP FILIBERT ROTH

1929

U-M's first forestry camp is established at an abandoned logging camp eight miles west and south of Munising in Alger County, Michigan.

1935

The camp moves to a beautiful new site in Iron County. The buildings consisted of a cookhouse, three bunkhouses, a shop, two garages, a large barn, one cottage, and a small office. The cookhouse was used with little alteration. One bunkhouse was converted into a classroom, and the other two were used as dormitories. The two garages were remodeled, the smaller one being used as an instrument room and the larger a meeting space the students called the "Michigan Union." During the first year, a central washroom was constructed which included an elevated tank into which the students pumped lake water by hand, thus affording "running water." There were also a small stove and a system of pipes to provide both hot and cold water for washing. Kitchen and drinking water came from a shallow well. The construction of improvements continued throughout the 1940s, and the camp remained in use until 1987.



CAMP FILIBERT ROTH IN THE EARLY YEARS

UNIVERSITY OF MICHIGAN BIOLOGICAL STATION

1909

The U-M Biostation was established on land acquired from lumber barons after virtually all the trees had been cleared. Student and faculty researchers studied a landscape ravaged by catastrophic logging and subsequent fires, allowing them to learn firsthand how land exploitation impacted the natural environment.

The Biostation's 10,000-acre property has since been reforested via natural processes. But new environmental challenges have emerged, climate change and invasive species foremost among them. Today, Biostation students engage in and learn about biology and environmental science by studying directly in the field and by developing relationships with some of the world's most respected experts.

SEAS students often recall Orientation at the Biostation as one of their most cherished memories. As they get to know their new classmates—many who become lifelong friends—on the wooded shores of Douglas Lake, they share three days of hiking, studying, and learning about the environment. Alumni describe it as the "perfect introduction" to SEAS.

Field fact: SEAS faculty and staff manage six nature areas totaling 1,761 acres.



ABOVE: U-M BIOSTATION, DOUGLAS LAKE (1909) | BELOW: ORIENTATION AT THE BIOSTATION (2015)



1927-1949



WOOD TECHNOLOGY

The Wood Technology program was adopted in 1934, and over the next thirty years, trained generations of students to use the raw material—and natural resource—of wood products most effectively.

In 1945, Bachelor of Science and Master's degrees in Wood Technology were established to distinguish the specialized training from traditional forestry training. That same year, a special program launched that would prepare men for technical and executive positions in the furniture industry.

In 1950, Dean Samuel Dana said, "The School of Forestry and Conservation is recognized nationally and internationally as outstanding, and has attracted students from all parts of the world. It has one of the best forest products laboratories in the country."

STINCHFIELD SAWMILL, 1940s

With an initial gift to U-M of \$37, the class of 1942 established a trust fund for the acquisition of a portable sawmill. The gift was motivated by the students' recognition of the need for practical instruction and experience in mill operation as a part of their professional training. The construction of the sawmill, largely funded by gifts from students and alumni, began operation in 1947.

LATIN-AMERICAN FELLOWSHIPS

In 1943, 20 fellowships were granted for Latin American students in Wood Technology and Forestry. In its first year, 17 students from Argentina, Chile, Ecuador, Guatemala, Haiti, Mexico, Paraguay, Peru, Puerto Rico, Uruguay, and Venezuela registered for the spring term. In 1944, an additional 10 fellowships were granted. In total, 31 students from 14 countries and Puerto Rico received fellowships from the program, which more than doubled the number of trained foresters and wood technologists in Latin-American countries—where many of those who participated went on to occupy positions of prominence in their fields.



ABOVE PHOTOS: STUDENTS AT THE WOOD TECHNOLOGY LABORATORY
BOTTOM PHOTO: GLENN BRUNEAU (BSF '41, MWT '58), LECTURER IN
WOOD TECHNOLOGY AND LABORATORY SUPERVISOR (1962-1973)
ALL PHOTOS ON THIS PAGE COURTESY OF GLENN BRUNEAU FAMILY



Photo by Ann Arbor News

FISHERIES MANAGEMENT

The Department of Fisheries Management found a new home in SNR in 1950. Professor Karl F. Lagler (PhD '40) was instrumental in the establishment of the department, and served as its chairman until 1965. Lagler achieved both national and international recognition as an expert on fisheries, conservation, and the fishes of the Great Lakes Region.

TOP RIGHT: PROF. KARL F. LAGLER (LEFT) AND A STUDENT ASSISTANT, PAUL NICHOLS, EXAMINING A LARGE BASS CAUGHT IN GOLDEN LAKE, NEAR CAMP FILIBERT ROTH (1952).

TOP LEFT: A FISHERIES CLASS TAKES A STAB AT SHOCKING FISH AT ONE OF THE LOCAL LAKES (1956).



JOHN CAROW

John Carow (BSF '37, MSF '38) joined the SNR faculty in 1947, and soon became the Director of Camp Filibert Roth—a position he would hold for the next 21 years. During his 32 years at SNR, Carow taught forest mensuration, timber harvesting, air photo interpretation, and forest management.



FRANK MURRAY

At Camp Filibert Roth, Frank Murray instructed students on forest surveying and mapping—the foundation of all their field skills. In 1948 he published the *Manual of Forest Reconnaissance and Growth*. Murray also supervised forest management at Stinchfield Woods, and was universally regarded as a mentor.



STEPHEN SPURR

In his 19 years at U-M (1952–1971), Stephen Spurr served as professor, acting Chair of Forestry, Dean of SNR, and Dean of the Rackam Graduate School. He authored *Forest Ecology* in 1964, and was the founder and first editor of the influential journal, *Forest Science*. Over the course of his career, Spurr gained a world-wide reputation in photogrammetry and aerial mapping as applied to natural resource inventory.

1950-1991



▲ SUMMER AT CAMP FILIBERT ROTH, 1958



◀ An abiding love for the outdoors, hard work and camaraderie at Camp Filibert Roth; Burt Barnes' Woody Plants course; and plaid shirts worn as "formal attire" at the annual Paul Bunyan Ball...these are the memories that alumni from the 1950s and 1960s most often share with us.

◀ 1954 SOCIETY OF LES VOYAGEURS INDUCTEES

AS THE OLDEST CONTINUALLY ACTIVE STUDENT GROUP ON THE UNIVERSITY OF MICHIGAN CAMPUS (FOUNDED IN 1907), THE SOCIETY OF LES VOYAGEURS UPHOLDS A LONG-STANDING TRADITION OF CONVENING OVER THE LOVE FOR NATURE AND THE OUTDOORS.

THE SCHOOL OF NATURAL RESOURCES

"The time is now ripe to replace that school with a still more comprehensive School of Natural Resources which would again be the first of its kind." —Samuel T. Dana

Following Dana's lead, the School of Forestry and Conservation became the School of Natural Resources (SNR) in 1950.

The decade of the 1950s was one of growth for the country and the SNR. Increased demand for forest products and wildlife management drove the need for the school to produce graduates capable of meeting the ever-increasing complexities of managing forests and wildlife habitat.

The forest products industry invested millions of dollars in reforestation efforts and forestry research in cooperation with forestry schools, the U.S. Forest Service, and many state forestry agencies. This effort required the expertise of well-trained foresters from the University of Michigan. It was not a surprise that these same foresters rose to leadership positions throughout the United States.

In 1952, the first Master in Wildlife Management and Master of Science in Conservation were conferred, and the first Master of Science in Fisheries was established. The following year, in honor of its 50th anniversary, the school was lauded by U-M for teaching wise management and use of natural resources as an important factor in the nation's economic and social well-being.

SNR recognized that the problems of the day required a broader education and set of skills, and that collaboration with other schools was a significant part of the solution. In 1953, SNR partnered with the business school, and inaugurated a combined program in which SNR students qualified for an MBA with only one additional year of study. A similar collaboration was made with the school of education to broaden the knowledge base of SNR graduates.

Two professors who joined the faculty in 1964 left a lasting impact on generations of students: Burt Barnes, who pioneered an ecosystem approach to landscapes, and Bill Stapp, recognized as the founder of environmental education.

Reflecting the need to continually broaden its educational base, SNR acquired the Department of Landscape Architecture in 1965. During this period, SNR also instituted a naturalist curriculum and expanded its offerings in forest recreation. The latter development resulted in the endowing of the Samuel T. Dana Professorship of Outdoor Recreation.

Within a few years, Samuel Dana's vision of a comprehensive program that would achieve widespread acclaim had been realized. Soon, a great many of the major textbooks used as the basis for educating foresters and wildlife managers at schools throughout the United States were authored by SNR professors.



WILLIAM STAPP (BS '51, MA '58, PhD '64)

Bill Stapp, who joined the faculty in 1964, came to be considered as "the founder of environmental education." He and his students formally developed and published a definition of the emerging field in 1969. Stapp spent his long career searching for the root causes of environmental issues—and helped students and others to find solutions to problems affecting their communities. Stapp's special interest was international environmental education, and he was the first chief of the United Nations Educational, Scientific and Cultural Organization's (UNESCO) Environmental Education Section. His environmental education program was the first to be unanimously accepted by all 135 UNESCO member nations. For many years, Stapp cooperated with public school systems in launching environmental monitoring programs in communities throughout the United States, especially in Michigan. He initiated the successful Rouge River recovery project, which involved students from 40 Detroit-area schools. Stapp was recognized with numerous national and international awards and was nominated for the Nobel Prize in 1993. Former student and life-long friend Belle Mickelson (MS '72) remembers Stapp this way: "Bill not only took us to the wilderness," she said, "he also took us to city hall. He taught us the importance of working with government to get things done."



DR. BURT BARNES TEACHES HIS WOODY PLANTS COURSE IN SAGINAW FOREST, 2003



BURT BARNES

During his decades on the faculty at U-M, Burt Barnes advised 19 doctoral students and 75 masters students and mentored three generations of academicians, research scientists, and practicing professionals. His two undergraduate courses in Woody Plants and Forest Ecology were taken by more than 6,000 students, and his undergraduate textbook, *Forest Ecology* (now in its fourth edition), touched countless other students and practicing professionals in North America and beyond. Barnes was a pioneer in bringing a landscape ecosystem approach to the United States and the United States Forest Service (USFS), and his approach to developing hierarchical ecological site classification systems continues to be used by USFS managers all across the country. His book, *Michigan Trees*, is undoubtedly one of the finest treatments of the natural history of trees on a state level. Barnes' many awards include the Arthur F. Thurnau Professorship for "outstanding contributions in undergraduate education."



"Over my career as a resource manager, first in forestry, then in wildlife, my time with Burt left me with a clear understanding that ecosystems are bigger than the sum of their individual parts and that individual ecosystem components are interdependent... Burt's mentorship prompted me to devote my life to working in the woods and fields of northern Michigan and to building a career around ecosystem management."

- Stephen Sjogren (BSF '79)

Fast Facts

Increases in research and shifting societal values led to major changes in the way forests and other natural systems were managed. At the national level, key legislation passed, which changed the way public and private lands were managed.

- 1960 Multiple Use, Sustained Yield Act broadens forest management on public lands.
- 1962 Publication of *Silent Spring* by Rachel Carson raises awareness of the dangers of pesticides, such as DDT.
- 1964 Wilderness Act
- 1969 National Environmental Policy Act (NEPA)

School Facts

- 1961 Remodeling of the West Medical Building is completed and renamed the Natural Resources Building, allowing SNR to unite all departments under one roof.
- 1965 Administration of landscape design transfers from School of Architecture and Design to SNR.
- 1966 Interdisciplinary programs in remote sensing begin with a collaboration with the Institute of Science and Technology, and continue to the present.





RICHARD COUCH WITH LARGE WHITE PINE



WAYNE BODEN IN CANOE AT GOLDEN LAKE



CAMP ROTH IN LOG SAWING COMPETITION WITH STUDENTS FROM PURDUE UNIVERSITY



BUCHOLTZ AND FRED EUBANKS

1959
Students at Camp
Filibert Roth
Photos by
Jerry R. Longcore



JIM DOOLEY



SCALING LOGS AT WATERSMEET, MI, SAWMILL



TED SMITH, WATERSMEET, MI, LOG YARD



STUDENTS GATHER FOR A DIAG RALLY DURING MICHIGAN'S 1970 TEACH-IN ON THE ENVIRONMENT.



DOUG SCOTT (BS '66)

Scott was an SNR student studying Outdoor Recreation under Professor Grant Sharpe when he became a primary organizer of Teach-in for the Environment as co-chair of Environmental Action for Survival, Inc. (ENACT). He was also named to Wisconsin Senator Gaylord Nelson's national planning committee for similar events around the country. Scott later became an environmental lobbyist, grassroots organizer, wilderness historian, and author—and played a major role in saving over 110 million acres of Alaskan wilderness.

TEACH-IN FOR THE ENVIRONMENT

The cultural sea change of the 1960s inspired a generation already engaged in civil rights, women's rights, and an end to the Vietnam War—to demand the protection of the planet. As the environmental movement gained traction, teach-ins were planned across the country to celebrate the first Earth Day in 1970. The largest and most visible of these, drawing an estimated 50,000 participants, was held in Ann Arbor. The five-day multi-faceted event included 125 seminars, speeches, workshops, panels, debates, forums, rallies, demonstrations, films, field trips, and concerts that unfolded at locations on campus and throughout the town.

Though the school would not be renamed until 1992, a new era had begun. The following decades would reshape SNR in profound ways.



ZOOLOGY PHD CANDIDATE DAVE ALLAN (PHD '71) CO-CHAIRING THE STUDENT GROUP THAT ORGANIZED THE EVENT, AND LATER SERVED AS SNR ACTING DEAN (2008-2009).



ALVARO UGALDE (MS '74)

Biologist Alvaro Ugalde is widely recognized as a father of the world-famous Costa Rica National Park System. In collaboration with Mario Boza, Ugalde successfully lobbied and achieved the creation of Costa Rica's first national park, Poas Volcano, in 1971. He remained active in the effort to preserve Costa Rica's 26 national parks until his death in 2016.



BUNYAN BRYANT



Professor Bunyan Bryant was recognized as a pioneer in Environmental Justice, and over his 40-year career was instrumental in establishing the school's Environmental Justice program, focusing on the differential impact of environmental contaminants and climate change on people of color and low-income communities.

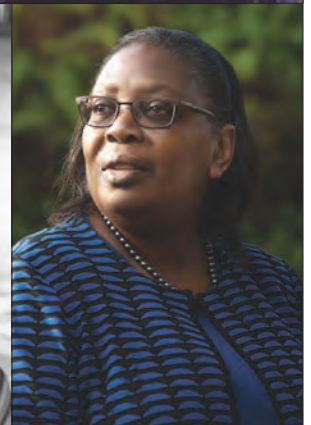
INCREASING DIVERSITY

Finding solutions to complex environmental challenges requires a broad spectrum of perspectives and experiences, and SNR began building a more diverse—and inclusive—community.

Women and people of color had been largely unrepresented at the school until the late 1960s, when the first set of barricades came down. In 1967, female students were invited to join their male classmates at Camp Filibert Roth, and in 1972, Bobbi Low became the first full-time female professor on the SNR faculty. In 1973, an Affirmative Action Program was approved to increase the number of women in the student body and in the faculty.

In 1972, Bunyan Bryant became the first African American to join the faculty. A pioneer in Environmental Justice (EJ), he was co-principal investigator of the U-M 1990 Detroit Area Study on Race and Toxic Waste. Along with faculty member Paul Mohai, Bryant organized the Race and the Incidence of Environmental Hazards Conference held at SNR that same year. The historic conference would help to springboard environmental justice as an academic discipline. Also participating at the conference was Dorceta Taylor, a dual PhD student at Yale at the time, who would join the faculty in 2002 as a renowned scholar in environmental justice history and a powerful voice in the EJ movement.

This year, SEAS is celebrating the 30th anniversary of the historic EJ conference.



TOP: 1990 MICHIGAN CONFERENCE ON RACE AND THE INCIDENCE OF ENVIRONMENTAL HAZARDS
BOTTOM LEFT: PROFESSOR BOBBI LOW
BOTTOM RIGHT: PROFESSOR DORCETA TAYLOR

Ninety-Three Years of Editorial Freedom

Ann Arbor, Michigan — Friday, April 8, 1983

Vol. XCIII, No. 149

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Frye under fire: Students stage sit-in
Group demands more open review process

MSA still waits for election results

By LAURIE DELATER
In this year's Michigan Student Assembly election, the computer won. Results of the election still were unknown last night because of a computer back-up, forcing anxious candidates to wait just one more day for the results.



Daily Photo by SCOTT ZOLTAN

Progressive Student Network (PSN) question Vice-President for Academic Affairs members of PSN look on.

By JIM SPARKS
Thirty-five students spent last night in the administration building after a sit-in in which they demanded more democracy in the University's "smaller-but-better" plan.

Frye discussed the review process at yesterday's Campus Meet the Press. See story, Page 5.

The students, most of them in the Progressive Students Network, walked up the back stairs of the building at about 1:30 p.m. and sat in front of the office of Provost Billy Frye, the architect of the plan to cut and redistribute \$20 million. WHEN FRYE, who is also vice president for academic affairs, came in about 10 minutes later, he calmly sat down and ate yogurt as they charged that his budget process is too secretive and not open to new ideas.

autocratic decision-making has no place in the University," said LSA freshman Naomi Brasine. The group demanded a new, more representative body to set University priorities; no further cuts over 10 percent until such a body is established; end to closed meetings of budget review panels; a statement of why certain schools are picked to be cut; and that the University take no legal or disciplinary action against the protesters. "WE ARE determined to remain here... until these demands are met," said LSA freshman Valerie Flapan. It was, however, rumored that the group would leave today at noon. Frye talked to the group for about two and a half hours, but refused to grant any of the demands. "We're not going to make those kinds of decisions or agreements on demand," he said. The group did come prepared with some granola, crackers, and fruit, but some University officials would not allow shipment of food in last night.

Frye said he had met with members of the Progressive Student Network who were conducting a sit-in in his office. Frye said, and one that he supported.

Group stages sit-in: Demands democracy

(Continued from Page 1)

"THE BUILDING is closed. We just couldn't keep opening it up and closing it," said Walt Stevens, director of the Department of Public Safety and Security. Telephone lines to the floor were also shut off. The students and Frye disagreed fundamentally on whether the budget process should be opened up more. Frye said instead of being closed, "the process is so open now it's almost out of control." He said making meetings of the Budget Priorities Committee (which makes recommendations on budget cuts) open to the public would expose too much of the "dissecting" that schools go under in the meetings.

FRYE SAID the views of the group are not widely reflected on campus, and pointed to the four sparsely attended forums on redirection as an example of failed attempts to give the community more of a voice. Organizers of the sit-in said apathy is one of the main reasons for their protest. LSA senior Jeff Selbin said he hoped it would "Let students know that other students are essentially willing to go to jail." In fact many of the participants did have bail money in case they were carried out of the building. But Stevens said the group would be allowed to stay in the building for the night. ONE OF the points the students kept emphasizing was how Frye decides which schools and departments should be cut, and which ones are "high-priority."

faculty and students wasn't one of the priorities of the five-year plan, and pointed to the fact that certain units designed to aid minorities are currently under review. Frye responded, "We don't know to what extent money is the problem. A disproportionate amount of financial aid already goes to minority students." But Frye said Marx had "no basis to allege... that we're not committed as an institution." He said in the last three or four weeks the University has been considering major changes in its minority efforts, but would not elaborate.

After Frye went home, leaving the students alone in the building with University Safety officers, several students said Frye had "listened" without hearing, and was not being receptive to new ideas. "Frye tried to turn it into, you have a philosophy and we have another."

22-hour sit-in ends
demands not met

By NEIL CHASE and BILL SPINDLE

After sitting in the provost's office for 22 hours to protest the lack of democracy in the University's budget redirection process, 35 students gave up their siege yesterday and walked single-file to their first meal since Thursday afternoon. The students, members of the Progressive Student Network, staged the sit-in to negotiate changes in the University provost and vice president for academic affairs. ALTHOUGH THE protesters said Thursday they would stay put until certain demands were met, they said yesterday that negotiations with Frye had reached an "impasse" and were no longer productive. The vigil ended at noon. The group entered the administration building demanding a new, more

representative body to set University priorities; no further cuts over 10 percent until such a body is established; an end to closed meetings of budget review panels; and a statement on why schools are selected to be cut. Although they were unable to convince Frye to concede in any of the four areas, the students said they were pleased with what had happened. "I FEEL GOOD about it," said Austin. "It's the first time we got some questions answered. But we came to an

impasse. That is why we came out. (Frye) was not going to negotiate a real changes with us." "I think we accomplished a lot," said LSA senior Tom Marx, leader of the network. "We had a chance to nail (Frye) down and get some answers." Frye returned to his office several times during the sit-in, including one visit around 9 p.m. Thursday night. The students said it was the first time they had been able to have a two-way discussion with the provost and press

See SIT-IN, Page 3

MSA results for



Sit-in participants leave the Fleming Administration Building yesterday for their first meal since they began their protest Thursday afternoon.

Daily Photo by DEBORAH LEWIS

FIGHT FOR THE SCHOOL

1983: On the heels of the recession in the auto industry, the state of Michigan reduced funding for public education, prompting U-M to reallocate funds in an effort to cut costs. Three schools were specifically targeted: The School of Natural Resources (SNR), the School of Art, and the School of Education. Students from the affected schools formed the Progressive Student Network to protest the proposed cuts, and in April 1983, organized a sit-in at the U-M administration building. Though the students ultimately reached an impasse with then provost Billy Frye, media coverage of their 22-hour demonstration brought the debate into the public sphere.

Alumni Glen Chown (BS '83, MS '86) and Sara Curran (BS '83) were both participants at the sit-in. Both credit James E. Crowfoot, who stepped in as acting dean on an emergency basis (after Dean Bill Johnson had stepped down), for saving the school on an administrative level.

GLEN: Our schools were under the threat of the chopping block. That was how severe things were. There were concerns that they were actually going to close down the School of Natural Resources—just eliminate the whole school.

And so there we were, as students, and I was in my second year of the program with people like Sara. We had taken Bunyan Bryant's course in energy, social change, and land ethics. We were close to Jim Crowfoot and the Environmental Advocacy Program, so we weren't going to take this lying down. We decided to organize, and we built a coalition around challenging the administration and their assumptions...And, of course, Bunyan Bryant was coaching us. He encouraged us to understand that when you have a principle and the powers-that-be aren't listening, but instead are making poor decisions, you have to take action.

SARA: Yes, it was both a principled argument and a procedural argument. We did a lot of legwork beforehand. We did press releases. We did research. We wrote up statements. It wasn't like we were a rabble at the moat waving pitchforks at the castle. We did our homework, and we had very close relationships with our faculty. The faculty were using different routes to communicate their standpoint, but they were supportive of what we were doing.

We voiced questions and concerns such as: How do you educate? How do you create quality educational experiences? It's not just about numbers and bodies in chairs. It's about creating collaboration between students and faculty.

GLEN: Billy Frye, the provost, did come out to have some dialogue with us, even though he wouldn't budge. But looking back, I think we were successful. They didn't close down the school. They did make significant cuts, as I recall, about 25 percent from SNR. But in some ways, it was an opportunity for SNR to look at its weaknesses as well as its strengths. That's the way Jim Crowfoot approached it.

That was 36 years ago. Here we are today, with President Schlissel making sustainability one of his top priorities. SNR is now the School for Environment and Sustainability (SEAS) and is being elevated not only as a fundamental part of U-M but as a leading program that will work in partnership with all the other sustainability programs on campus. In this role, and with expanded resources, I believe SEAS will meet the challenges of the Planet Blue initiative on campus, at our field stations, and in society on a global scale.

Glen Chown (BS '83, MS '86) is the founding executive director of the Grand Traverse Regional Land Conservancy. Since the Conservancy's founding in 1991, nearly 41,000 acres of land and over 121 miles of shoreline along the region's scenic rivers, lakes, and streams have been protected. Glen is a member of the Land Trust Alliance's Leadership Council as well as a founding board member of Michigan's Heart of the Lakes Center for Land Conservation Policy.



Sara Curran (BS '83) is the director of the Center for Studies in Demography and Ecology, a professor of International Studies and Sociology, and an adjunct professor in the Department of Global Health at the University of Washington. Curran researches migration, globalization, gender, climate change and adaptation, and development.



AN EXPANDING CURRICULUM

To meet emerging environmental challenges in the late 1960s, 1970s, and 1980s, SNR developed more interdisciplinary programs, added concentrations in the social sciences, and expanded the school's reach. A few highlights include:

- An interdisciplinary program in remote sensing, launched in collaboration with the Institute of Science and Technology, and still in operation today
- Environmental communications courses
- A Wildlands Management Center linked with several countries and international organizations addressing global environmental concerns
- Concentrations in (1) resource ecology and management, (2) resource policy and behavior, and (3) landscape architecture
- A microcomputer laboratory installed in the basement of the Dana Building
- A multi-year grant from the Hewlett Foundation, beginning in 1983, to support a further redesign of its integrative interdisciplinary curriculum

Continuing efforts to expand the curriculum reflected a broadening of research interests in faculty and students.





RACHEL KAPLAN

A leader in the field of environmental psychology, Professor Kaplan sought to understand the role the environment plays in helping people become more reasonable, effective, and psychologically healthy. Her work with husband Stephen Kaplan on Attention Restoration Theory, as it came to be known, influenced how generations of landscape design professionals and environmental psychologists view humanity's relationship with nature.

THE BRUNDTLAND COMMISSION

In recognition of the heavy deterioration of the human environment and the world's natural resources, the United Nations established the Brundtland Commission in 1983. The commission's mandate was to identify critical sustainability issues worldwide, formulate innovative and realistic solutions, and create a united international community with shared sustainability goals. *The Brundtland Report*, released in 1987, defined the new concept of "sustainable development" to consist of three essential pillars: economic growth, environmental protection, and social equality, stating that: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Gro Harlem Brundtland, former prime minister of Norway, recent director-general of the World Health Organization, and chair of the UN World Commission on Environment and Development, delivered the annual Wege Lecture at SNRE in 2004.

MASTER'S PROJECTS

Launched in the mid-1980s, master's projects offer an alternative to the standard thesis. Initially proposed by long-time faculty member and SNR alumnus Steve Yaffee, the interdisciplinary capstone experience enables student research teams to develop innovative solutions to pressing problems faced by real-world clients and partners.



RESEARCH PROJECT IN 1970s



MASTER'S PROJECT: ASHLEY DICKERSON (MLA '17) AND QIANYUN YUAN (MLA '17) WORKED WITH FORESTATION IN NEPAL

Fast Facts

1973

Regents name Natural Resources Building the Samuel Trask Dana Building

1988

The school's field training site moves to the U-M Biological Station



JAMES E. CROWFOOT

JAMES E. CROWFOOT joined the school in 1972 as a professor of natural resources and urban and regional planning. Crowfoot served as dean of SNR from 1983-90, guiding it through a challenging period of change and reorganization. He also established a new research division and fundraising program. Crowfoot's teaching and research centered on conflict management in environmental and other social-change organizations, environmental education, and social inequities and justice.



STUDENTS IN THE FIELD
WITH THE INSTITUTE OF
FISHERIES RESEARCH, 2004

THE SCHOOL OF NATURAL RESOURCES AND ENVIRONMENT

The rise of the modern environmental movement in the late 1960s had awakened public awareness in the intervening decades. Despite resistance from those opposed to government regulation, there was now a global movement concerned with the issues of increasing population, the health effects from industrial pollution—and the alarming loss of old-growth forests, clean drinking water, fertile top soil, and wildlife. New studies, including Bill McKibben’s 1989 release of his landmark book, *The End of Nature*, warned of yet another emerging phenomenon: climate change.

Upon this stage, the School of Natural Resources proved itself to be a leader in the U.S. educational community when, in 1992, U-M officially changed the name to the School of Natural Resources and Environment (SNRE). The new identity recognized the interconnected ecosystems of human society within the physical world—and signaled the school’s intention to pursue deeper exploration in the natural and social sciences.

THE SAMUEL TRASK DANA BUILDING

underwent a five-year green renovation and received Gold LEED Certification from the U.S. Green Building Council. The Dana Building became the first major academic renovation to receive such a high rating in the state of Michigan, and was among the first in the country.



SNRE ENVIRONMENTAL JUSTICE STUDENTS, 2013

ENVIRONMENTAL JUSTICE

SNRE was the first school in the U.S. to launch an Environmental Justice program that offered undergraduate and graduate degree specializations. Established by Bunyan Bryant and Paul Mohai in the 1990s, the program would gain the expertise of Dorceta E. Taylor, professor, author, and historian, in 2002.

NEW CROSS-CAMPUS PARTNERSHIPS

It was integral to Dean Samuel Dana's original vision for the school to create well-rounded professionals by giving students a holistic and interdisciplinary education. In the 1990s, SNRE made bold strides toward achieving that vision through cross-campus environmental initiatives, grant-funded projects, and newly founded institutes.

Erb Institute (1996)

Michigan alumni Frederick and Barbara Erb gifted \$5 million to launch the Erb Institute, providing students the opportunity to pursue an MS degree and MBA simultaneously. After the institute was established, the Erbs continued to support this joint venture with gifts that totaled \$20 million, representing the largest known commitment to a university for interdisciplinary teaching and research in the area of global sustainability.

Center for Sustainable Systems (CSS) (1999)

CSS provided a space for life cycle design and assessment with more than 100 research projects. Supported by the Peter M. Wege Foundation, CSS is globally recognized as a leading academic institution for this research.

Engineering Sustainable Systems (2007)

The College of Engineering welcomed the opportunity to bring sustainability and engineering together with the creation of the dual degree program with SNRE: Engineering Sustainable Systems.

Sustainable Food Systems Initiative (2007)

This forward-thinking initiative was created to engage an interdisciplinary mix of students, faculty, and communities at local and global levels to learn from and build food systems that are health-promoting, economically viable, equitable, and ecologically sound.

Graham Environmental Sustainability Institute (2007)

Launched as a campus-wide organization accessible to all students and faculty, the institute's mission was to "encourage synergy and facilitate multidisciplinary research and teaching on sustainability."

Sustainability Without Borders (SWB) (2011)

SNRE students were leading the charge to engage with the global community. SWB, founded by Jose Alfaro (PhD '14)—a student at the time, and now a SEAS faculty member—has partnered with communities, governments, and aid organizations to successfully develop and implement projects to address resource scarcity in the areas of water, energy, food and waste. Their work has impacted communities from Liberia to Detroit.



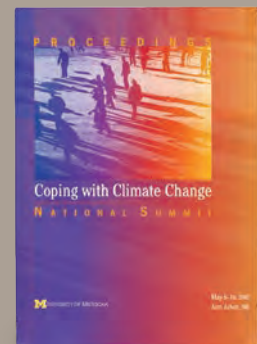
**ROSINA
BIERBAUM**

Rosina Bierbaum served as dean of SNRE from 2001 to 2011. She is the chair of the Science and Technical Advisory Panel of the Global Environment Facility, and served on President Obama's Council of Advisors on Science and Technology. As an Adaptation Fellow at the World Bank, she led the Adaptation chapter for the congressionally mandated U.S. National Climate assessment, and was a review editor for the Intergovernmental Panel on Climate Change.

COPING WITH CLIMATE CHANGE NATIONAL SUMMIT

In 2007, U-M held the first national summit that addressed climate change adaptation. The summit, organized by then SNRE Dean Rosina Bierbaum, along with other SNRE faculty, students, and staff, focused on helping the citizens of the U.S. prepare for the future impacts of climate-based changes in temperature, precipitation, sea level rise, and species range.

The Intergovernmental Panel on Climate Change, of which current Dean Jonathan Overpeck and Rosina Bierbaum are members, received a Nobel Prize for its work in this area.





1966 SNR FORESTRY AND WOOD TECHNOLOGY DEPARTMENT FACULTY

LEFT TO TIGHT: 1. SAMUEL GRAHAM, 2. BURT BARNES, 3. GRANT SHARPE, 4. CHUCK OLSON, 5. HUGH DAVIS, 6. FRANK MURRAY, 7. NORM FRANZ, 8. GLENN BRUNEAU, 9. BOB ZAHNER, 10. LARRY TOMBAUGH (DOCTORAL STUDENT OF BOB GREGORY), 11. DOCTORAL CANDIDATE WILLIAM A. LEUSCHNER, 12. SAMUEL T. DANA, 13. UNKNOWN DOCTORAL STUDENT, 14. ALLAN MARRA, 15. JOHN CAROW, 16. ROSS TOCHER, 17. KEN DAVIS, 18. FRED KNIGHT

Photo by Jean McGregor



SEAS FACULTY, 2018

THE SCHOOL FOR ENVIRONMENT AND SUSTAINABILITY

In the 25 years since the establishment of the School of Natural Resources and Environment in 1992, the world had been changing at a speed not seen since the middle of the 19th-century and the birth of the Industrial Revolution. Rapid increases in population worldwide, combined with economic growth, resulted in a human ecological footprint that was changing climate, ecosystems, and other key resources in a manner that most scientists believed to be unsustainable.

Recognizing that schools within a college or university could no longer afford to focus solely on their specific area of expertise to tackle these global challenges, the leadership of U-M, from the president and provost to the dean of SNRE, believed that there was a need for a new model for the research and education conducted within the school.

Once again, the school that began as a small department in 1903 saw the need to further evolve in order to meet the needs of a rapidly changing world. This resulted in the creation of the School for Environment and Sustainability (SEAS) in 2017. SEAS aims to provide a focal point and a leading voice of the campus community on sustainability in association with environment and society.

In each stage of its evolution from 1903 to the present, the school has exhibited leadership ahead of its time in serving the needs of its students and society at large. Every graduate, no matter when they attended, can take pride in the education they received. One does not need to look far to see the positive effects graduates made in translating the education they received at the University of Michigan to solving the problems of the day, whether that day was in 1903 or 2017.

THE BIG TEN+2

Throughout our history, we have changed the game in the environmental fields through the innovations and achievements of our alumni, faculty, and students. Here are just a few of our “leaders and best.”

FIRST U.S. COURSES IN THE SCIENCE OF FORESTRY

U-M became the first institution in the U.S. to offer forestry courses as an integral part of the curriculum. Dr. Volney Morgan Spalding—who championed the course—was himself a botanist and aware of the need to place forestry on a sound scientific foundation. Housing the course in the School of Political Science reflected Spalding’s recognition of forestry’s influence on the social and economic welfare of the country.

SCHOOL OF FORESTRY AND CONSERVATION IS FIRST OF ITS KIND IN U.S.

“The word ‘conservation’ was added to the name of the school to indicate that its interpretation of forestry is much broader than the ordinary conception, and to emphasize the fact that in addition to the training of professional foresters, one of its important functions is to teach the philosophy of conservation as the fundamental basis of permanent national prosperity.”

– Samuel T. Dana, *Michigan Alumnus*, May 11, 1929.



FIRST AFRICAN AMERICAN PHD IN CONSERVATION:

THEODORE R. SPEIGNER

Theodore R. Speigner (PhD ‘61) was a vocal and inspiring advocate for increasing the presence and expertise of African Americans in the geography profession, particularly teachers. He went on to become the founder and chair of the North Carolina Central University Department of Geography.

1881

1903

NEW DEPARTMENT OF FORESTRY PIONEERS FIELD-BASED LEARNING

“Week after week, he [Filibert Roth] sent his ‘boys’ packing on foot out to Saginaw Woods, an 80-acre reserve at Ann Arbor’s western edge. On this farmed-out plot—donated to U-M by Regent Arthur Hill (namesake of Hill Auditorium)—Roth’s students improved the soil and planted some 40 species of trees to see which would fare best.” –*Michigan Today*, 2017

1927

1950

SNR PROFESSOR TEACHES THE FIRST U-M TELECOURSE

SNR Professor Karl F. Lagler (PhD ‘40) taught the first university telecourse, and went on to complete more than one hundred educational television programs, as well as a weekly radio show on conservation from 1963 to 1972. Also in 1950, Lagler was instrumental in the establishment of the Department of Fisheries within SNR, and served as its chairman until 1965.

1961

1966-'86

LEADER IN THE DEVELOPMENT OF ENVIRONMENTAL LAW

SNR professor Joe Sax became the leading voice among scholars helping to develop the present-day American environmental law system. He also mentored hundreds of Michigan students, who went on to become leaders themselves in environmental law.





FOUNDER OF ENVIRONMENTAL EDUCATION

William Stapp and his students formally developed and published the first paper that defined “environmental education” in 1969. Dr. Stapp is considered the “founder of environmental education” and spent his career searching for the root causes of environmental issues, and helping students and adults find solutions to problems affecting their communities.

LEADERS IN ENVIRONMENTAL PSYCHOLOGY

The Experience of Nature: A Psychological Perspective, published in 1989 by Dr. Rachel Kaplan and husband Dr. Stephen Kaplan, introduced “restorative environments” and Attention Restoration Theory—concepts that would influence how generations of landscape design professionals and environmental psychologists view humanity’s relationship with nature.

CENTER FOR SUSTAINABLE SYSTEMS (CSS)

CSS is an evolution of the National Pollution Prevention Center for Higher Education, which was created in 1991. Launched in 1999 by co-founders Jonathan Bulkley (left) and Greg Keoleian (right), CSS has become globally recognized as a leading academic center for life cycle assessment, systems analysis, interdisciplinary research, education, and outreach.

1969

1989

1999

1985

1992

2007

FIRST ENVIRONMENTAL MASTER’S PROJECTS

SNR was the first environmental school to offer team-based master’s projects, founded on the belief that problems are solved by teams in the real world. Students report that the interdisciplinary master’s projects, offered as an alternative to the traditional thesis, are an invaluable experience that prepares them to excel in the workplace.

FIRST ENVIRONMENTAL JUSTICE PROGRAM

SNRE became the first and only school in the U.S. to launch an Environmental Justice program— spearheaded by Dr. Bunyan Bryant—that offered both undergraduate and graduate degree specializations.

FIRST NATIONAL SUMMIT TO ADDRESS CLIMATE CHANGE ADAPTATION

The “Coping with Climate Change National Summit,” organized by then SNRE Dean Rosina Bierbaum, along with other SNRE faculty, students and staff, focused on helping the citizens of the U.S. prepare for the future impacts of climate-based changes in temperature, precipitation, sea level rise, and species range.



MEETING

THE

FUTURE



**CITIES + MOBILITY +
BUILT ENVIRONMENT****CLIMATE + ENERGY****CONSERVATION +
RESTORATION****FOOD SYSTEMS****WATER**

SEAS SUSTAINABILITY THEMES

Designed as rallying points for collaborations around research, teaching, and civic engagement, the school's new sustainability themes provide a framework for students, faculty, and staff across campus to be involved in a wide range of interdisciplinary activities in partnership with SEAS.

EXHIBIT A: LIGHTNING TALKS

In 2019, SEAS hosted a series of Lightning Talks—fast-paced five-minute lectures presented by more than 50 sustainability scholars from 22 different U-M schools, colleges, and units. Each set of talks centered around one of the SEAS sustainability themes, and was designed to spark new interdisciplinary research, teaching, and engagement.

Tapping into the enormous potential for collaboration, speakers from across the university discussed research projects like urban forests and green spaces, energy storage, coastal changes, environmental hazards, and biodiversity. SEAS extended invitations to the arts, humanities, engineering, and the social sciences to continue developing the body of work necessary to mitigate climate change, create equitable infrastructure, and provide quality food and water for all on our planet.

Presentation videos are available on the SEAS YouTube channel. Learn more about the research at the University of Michigan and SEAS, and new ways we are working together to create a more sustainable future.



CITIES+MOBILITY+BUILT ENVIRONMENT

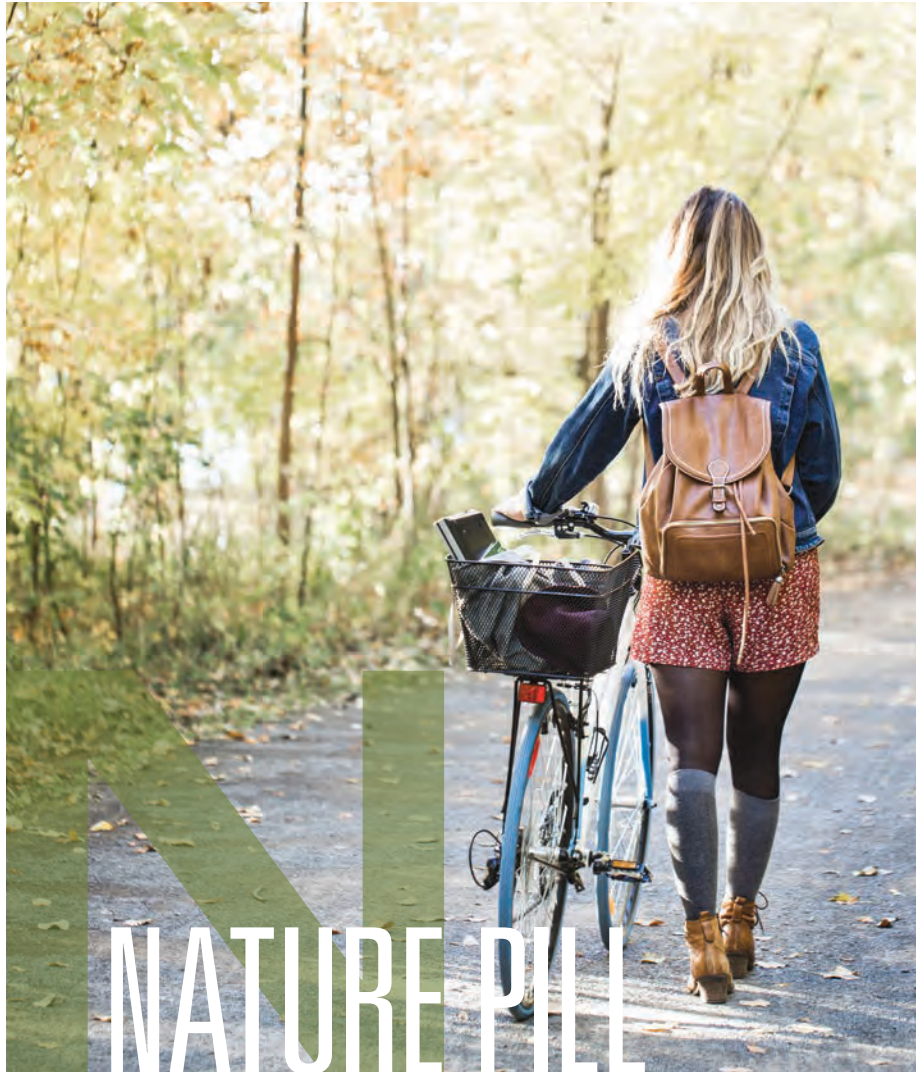
CHANGING THE GAME IN URBAN DESIGN AND TRANSPORTATION

More than half of the world's population currently lives in urban areas, with this percentage projected to increase dramatically in coming decades. The health of our planet and its inhabitants depends on developing new strategies for human settlement and activity that foster sustainable outcomes. The SEAS community responds by working to build infrastructure to foster human connectivity.

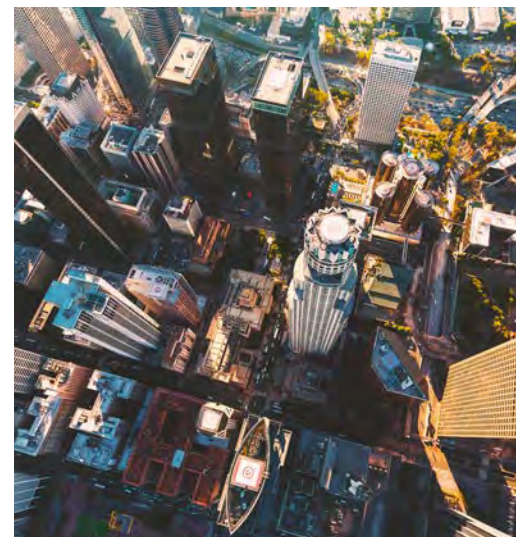
20 MINUTES: AMOUNT OF TIME NEEDED TO EXPERIENCE THE BENEFITS OF NATURE.

Taking at least twenty minutes out of your day to stroll or sit in a place that makes you feel in contact with nature will significantly lower your stress hormone levels. That's the finding of a recent Mcubed study—led by SEAS Landscape Architecture Professor MaryCarol Hunter—that has established for the first time the most effective dose of an urban nature experience. Healthcare practitioners can use this discovery, published in *Frontiers in Psychology*, to prescribe 'nature-pills' in the knowledge that they have a real measurable effect.

"We know that spending time in nature reduces stress, but until now it was unclear how much is enough, how often to do it, or even what kind of nature experience will benefit us," said Hunter. "Our study shows that for the greatest payoff, in terms of efficiently lowering levels of the stress hormone cortisol, you should spend 20 to 30 minutes sitting or walking in a place that provides you with a sense of nature."



The Mcubed study builds upon the work of environmental psychologist and SEAS Professor Rachel Kaplan, who along with her husband Stephen Kaplan, published *The Experience of Nature: A Psychological Perspective* in 1989, a book that influenced how generations of landscape design professionals and environmental psychologists view humanity's relationship with nature.





ARTIST'S RENDERING OF A FLYING CAR: LOOK CLOSELY TO SEE THE RESEARCH TEAM INSIDE.

Q: ARE FLYING CARS SUSTAINABLE?

A. Only fully-loaded, four-occupant electric-powered flying cars for trips longer than 60 miles result in fewer emissions than average occupancy ground-based cars. A single-occupant flying car never outcompetes a single-passenger electric ground-based car.

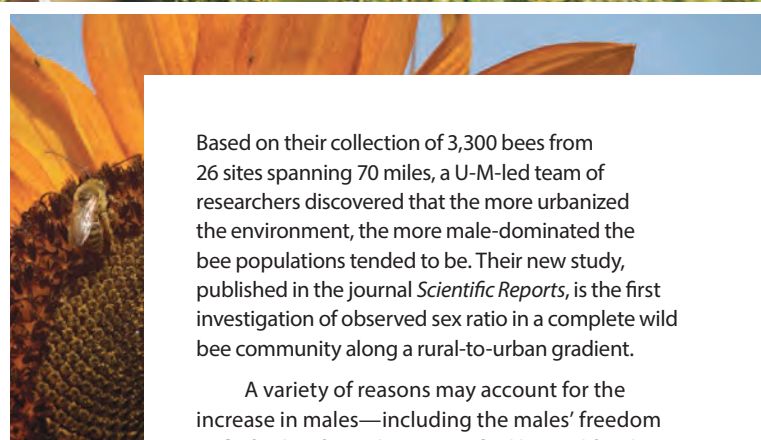
An interdisciplinary team conducted groundbreaking research to guide the deployment of flying cars from a sustainability perspective before they even go to market. Their paper, entitled "Role of flying cars in sustainable mobility," was published by *Nature Communications*, and received extensive media coverage, including write-ups in *Popular Science* and *Forbes*.

The research team included two SEAS students—Akshat Kasliwal (MS '19), first author of the study, and Jim Gawron (MEng '11, MS/MBA '19), a dual degree master's student at SEAS and the Ross School of Business (Erb Institute)—along with Noah Furbush (BSE '18, MEng '19), a master's student at the U-M College of Engineering, and Greg Keoleian, senior author of the study, professor, and director of the Center for Sustainable Systems at SEAS.



THE LATEST BUZZ

CAROLINA SIMAO ROE-RAYMOND (PHD '17)
GATHERS BEES FOR THE STUDY.



Based on their collection of 3,300 bees from 26 sites spanning 70 miles, a U-M-led team of researchers discovered that the more urbanized the environment, the more male-dominated the bee populations tended to be. Their new study, published in the journal *Scientific Reports*, is the first investigation of observed sex ratio in a complete wild bee community along a rural-to-urban gradient.

A variety of reasons may account for the increase in males—including the males' freedom to fly farther from the nest to find limited food sources, the lack of available habitat for ground-nesting females, and alternatively, sex allocation by the bees themselves. Male bees, as it turns out, take less work to produce.

Based on their results, the study authors suggest that past research may have been underestimating the negative impacts of urbanization on ground-nesting bees, as well as the importance of considering sex-specific differences in bee behavior.

Study co-author Paul Glaum is a postdoctoral fellow in the U-M Department of Ecology and Evolutionary Biology (EEB).

"Female and male bees of the same species often pollinate different plant species," said Glaum. "As a result, a decline in female bees has the potential to limit pollination services for part of the plant community."

The other co-first authors of the *Scientific Reports* paper are U-M doctoral students Gordon Fitch and Chatura Vaidya of EEB; and Carolina Simao Roe-Raymond (PhD '17), now at Princeton University.





Detroit mural by Jen Boyak

COOLING DETROIT

Urban planners have sought to alleviate “heat islands”—urban areas created by high concentrations of pavement and buildings—with the cooling benefits of green rooftops and other forms of green infrastructure. But a new study, conducted by SEAS alum Lino Sanchez (MS ’18) and Professor Tony Reames, revealed that green roofs specifically were located in the affluent part of Detroit’s urban core, where the population is predominantly white—rather than in those low-income communities that are often without access to green spaces, leading to a greater risk of heat-related illnesses.

In tandem with health issues, energy justice concerns also arise, the study states, when considering the lack of access to air conditioning in disadvantaged communities, or the inability to afford it when available.

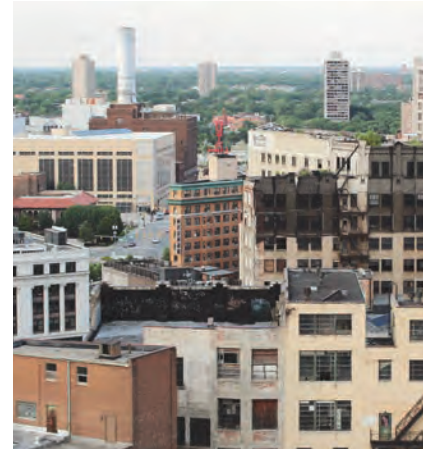


Photo by Ann Millsbaugh

A SHORTCUT NAMED “DESIRE”

A new study published for the *Landscape and Urban Planning* journal identified 5,680 informal footpaths—totaling 157 miles—crisscrossing Detroit’s urban landscape. Blazed by pedestrians seeking shortcuts across vacant lots and public spaces, the footpaths are also known as “desire lines.”

Study authors Professor Joshua Newell (SEAS) and Professor Alec Foster (Illinois State University) describe the paths as “creative attempts to expand urban possibilities, enhance efficiency, and reaffirm agency in increasingly regulated cities.” The authors found that desire lines in Detroit, however, are rapidly disappearing. From 2010 to 2016, the Lower Eastside region of the city witnessed a 70-percent reduction in the total length of these lines. Their analysis showed that the decrease correlates with changes in land ownership, management practices, and population dynamics.

“A major argument for formalizing and preserving desire lines is to increase neighborhood walkability and mobility,” said Newell. “This is especially important in places like Detroit where more than 25 percent of the population do not own cars.”



Despite the prevalence of desire lines, especially in post-industrial cities, no comprehensive study of desire lines existed for any urban area before Foster and Newell completed their work. The researchers identified Detroit’s desire lines by combining remote sensing and spatial analysis with physical audits and interviews.



CLIMATE+ENERGY

CHANGING THE GAME IN PLANETARY CARBON EMISSIONS

Climate change, one of the greatest challenges facing society, requires large-scale implementation of both mitigation and adaptation strategies. Transforming the energy system through supply and demand changes is critical to address this challenge. The SEAS community responds by working to provide energy solutions for stable climate systems.



CLIMATE MATTERS IN MICHIGAN

FROM LEFT: TRISH KOMAN, ZACHARY ROWE, PAMELA PUGH, SHANNON BRINES, AND PAIGE FISCHER DISCUSS CLIMATE ISSUES AT THE CRISLER CENTER ON AUGUST 9, 2019. PHOTO BY ERIC BRONSON. COURTESY OF THE UNIVERSITY OF MICHIGAN SCHOOL OF PUBLIC HEALTH.

Nearly fifty years after the 1970 Teach-In on the Environment, which began with a rally in Crisler Center, the School of Public Health (SPH) invited five colleagues, including two SEAS faculty members, to discuss what climate change will mean for the state of Michigan’s environment and its people. Gathered in Crisler’s Hall of Honor, they shared insights from their work and research in the region and their hopes and concerns for communities across the state.

“We’ve made incredible progress in air quality. Climate change is bigger, but we know we can make significant shifts.”

—**TRISH KOMAN**
SPH Research Investigator in Environmental Health Sciences

“Moving forward, we have to talk not only about economic and environmental impacts but health impacts.”

—**ZACHARY ROWE**
Executive Director, Friends of Parkside in Detroit

“In Flint, we’re looking to help residents and businesses become part of the fastest growing job market—solar and wind energy.”

—**PAMELA PUGH**
Chief Public Health Advisor, City of Flint

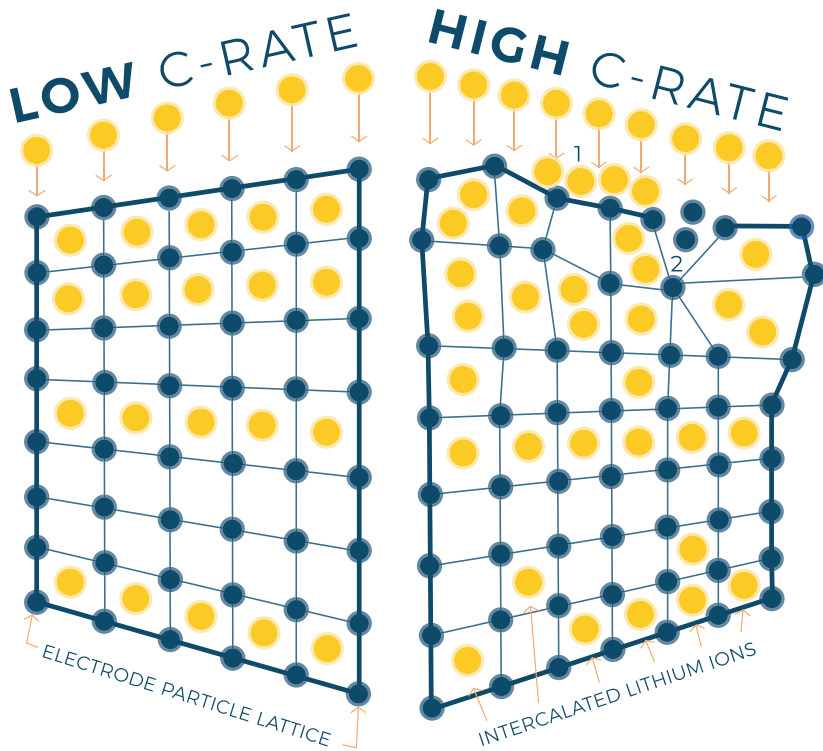
“We often focus on production, but we need to look closely at the ways a farm stewards its landscape.”

—**SHANNON BRINES**
Applied Geographer at SEAS and Washtenaw County farmer

“The solution is creating processes where people affected by climate change are at the table with people who have access to information and who have influence over decision making.”

—**PAIGE FISCHER**
Assistant Professor, SEAS

Read the full discussion titled “Climate Matters in Michigan: Pressing realities for a state and a region”—which appears in the SPH publication, *Findings Magazine*



LEADING THE CHARGE

As the number of electric vehicles (EVs) replacing internal combustion engine vehicles increases worldwide, the potential to reduce greenhouse gas emissions (GHGs) grows more promising. But given the complexities of battery systems—a key component of EV energy storage—the design, manufacture, use, and disposal of batteries are critical elements in determining environmental impacts.

Under sponsorship from the national nonprofit Responsible Battery Coalition (RBC), SEAS researchers have identified 10 new “Green Principles” that guide responsible management in the full lifecycle of EV batteries.

The authors of the study, Maryam Arbabzadeh (PhD '18), research specialist Geoffrey Lewis (PhD '06), and Greg Keoleian, professor and director of the Center for Sustainable Systems (CSS), are working with the RBC on educational campaigns that will advance the Green Principles into further practice.

Keoleian noted that CSS just finished developing recommendations for users on how to extend the battery service life of cellphones, laptops, power tools, and electric vehicles. Their research will be published in coming months.

SEAS researchers at CSS have also developed a comprehensive set of Green Principles for Vehicle Lightweighting, as well as a set of strategies to limit degradation and maximize service lifetime in lithium-ion batteries.

The charging-rate diagram above is a simplified representation of the electrode particle lattice structure of a new battery (LEFT) contrasting with a battery that has degraded over time (RIGHT). Fast charging (high C-rate) accelerates battery degradation due to 1) lithium plating, and 2) electrode lattice cracking.

FAKE NEWS FACEBOOK

SEAS doctoral student Lauren Lutzke (MS '19) and fellow researchers from SEAS and the Erb Institute created a set of guidelines and techniques to help spot disreputable news on climate change. Lutzke and her team found that these simple guidelines can have a positive impact on a user's evaluations of Facebook content. Those exposed to the guidelines were less likely to “trust, like, and share” fake news about climate change. The study also found that these same intervening guidelines did not have a negative effect on legitimate climate news. “This research definitely opens the door to preventing other areas of fake news, but fake news about climate change is especially problematic because climate change itself is such a widespread, global problem,” Lutzke said. “Anything that can be done to limit the influence of fake news should be pursued. Our research is promising since it shows that small, simple interventions on Facebook can help.”

Lutzke was joined in the research by Joe Árvai, professor of sustainability and environment and faculty director at the Erb Institute, and Caitlin Drummond, a postdoctoral fellow at the Erb Institute. Paul Slovic of Decision Research was also a co-author. Their work was published in *Global Environmental Change*.

Ask Yourself:

- 1 Do I recognize the news organization that posted the news story?
- 2 Does the information in the post seem believable?
- 3 Is the post written in a style that I expect from a professional news organization?
- 4 Is the post politically motivated?



CONSERVATION + RESTORATION

CHANGING THE GAME IN ECOLOGICAL RESEARCH AND MANAGEMENT

Nearly everything humans eat, drink, and breathe is the product of a living organism that inhabits a natural or human-dominated ecosystem. Protecting biological diversity and ecosystem function through conservation and restoration is necessary to produce the goods and services that allow people to prosper. The SEAS community responds by working to protect the Earth's biodiversity and ecosystem services.



U-M INSTITUTE FOR GLOBAL CHANGE BIOLOGY

The new U-M Institute for Global Change Biology—spearheaded by SEAS faculty Allen Burton and Inés Ibáñez, along with colleagues Allison Steiner (College of Engineering) and Knute Nadelhoffer (Department of Ecology and Evolutionary Biology)—is among the U-M projects funded in the first round of investments from President Mark Schlissel's Biosciences Initiative.

Global change biology seeks to understand the biosphere's responses to a variety of human activities, including climate change and shifting ecological regions, land-use conversion, release of pollutants, and species introductions. The new institute will foster research to understand and forecast the interactive effects of global change drivers on organisms and ecosystems.

"The Institute for Global Change Biology will address what may become a wicked problem of the 21st century: the growing interdisciplinary bioscience challenges associated with climate change, disease, invasive species, pollution, and a growing human population," said SEAS Dean Jonathan Overpeck.

50%
INCREASED LIKELIHOOD OF
REDUCING BOTH DEFORESTATION
AND POVERTY IN AREAS WITH
COMMUNITY FORESTS COMPARED
TO THOSE WITHOUT

SEAS Professor Dr. Arun Agrawal teamed up with Johan Oldekop of the University of Manchester to conduct the largest study yet on community-based forest management. Their findings—including the statistic above—were published in *Nature Sustainability*.



COMMUNITY FOREST USER GROUP IN NEPAL
PHOTO BY CHANDRA SHEKHAR KARKI/CIFOR

<4% OF ENVIRONMENTAL ORGANIZATIONS REPORTING STAFF DEMOGRAPHIC DATA AS OF 2019

In 2014, when SEAS Professor Dr. Dorceta Taylor released her groundbreaking report, *"The State of Diversity in Environmental Organizations,"* she called for more reporting on the demographic characteristics of environmental organizations.

Subsequently, Green 2.0, an initiative focused on increasing racial diversity across mainstream environmental organizations, partnered with GuideStar, a digital clearinghouse of nonprofit sector information, to make such reporting part of the profile that environmental nonprofits put on the GuideStar platform.

Taylor found that five years later, despite the efforts of Green 2.0 and GuideStar, less than 4 percent of the 1,254 nonprofits included in the study are reporting demographic data about their employees.

"Environmental organizations lack racial diversity and little information is publicly available on the demographic characteristics of these institutions," said Taylor. "An important step in creating more diverse and inclusive environmental organizations is to be transparent about the status of diversity within this sector of the workforce."

Taylor's most recent study was published in the journal, *Sustainability*.

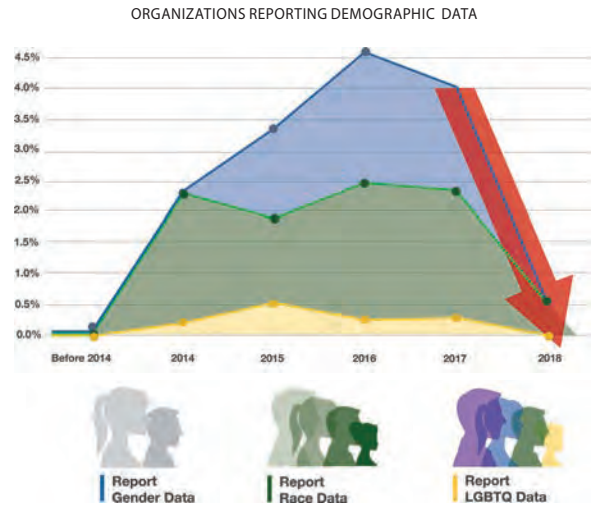




PHOTO BY KALAHEO KAUAI



JONATHAN MORRIS (MS '16)
EXAMINES THE HEALTH OF THE COFFEE BEANS.



CLOSING THE GAP

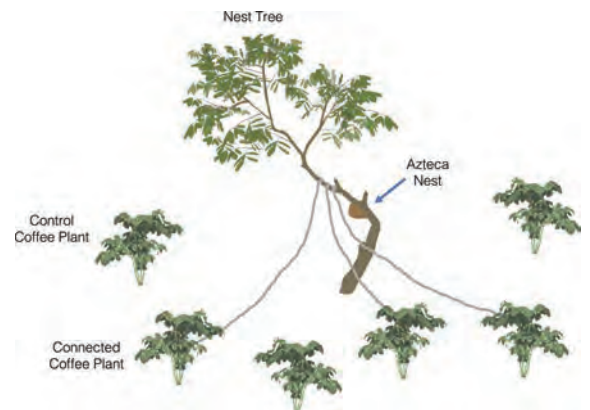
The berry-borer beetle could be standing between you and your next cup of coffee. Brazil alone reportedly loses \$300 million annually due to beetle infestation on its coffee plantations. One of the challenges for coffee growers is the fact that colonies of the beetles spend their entire lives within the precious berries – destroying the berries while remaining protected from pesticides.

Conducting research with a team of colleagues on a coffee plantation in Chiapas, Mexico, SEAS alumnus and doctoral student Jonathan Morris (MS '16) and Estelí Jimenez-Soto of the University of California, Santa Cruz, decided to enlist the help of the Central American ant called *Azteca sericeasur*, a natural predator of the berry-borer beetle. The Azteca ants, they learned, were fond of nesting in nearby Inga trees, but lacked a way to travel across the gap between their nests and the coffee plants.

Morris and Jimenez-Soto's solution was to build the ants a bridge—or in fact, many. Their “rope bridges,” made from single lines of string connecting the Inga trees with the coffee plants, soon became a major thoroughfare for the ants.

Ultimately, the study, published in the journal *Myrmecological News*, revealed that the string bridges increased the overall rate of beetle removal—giving coffee growers an innovative method that may one day close the gap between their hard work, a sustainable crop, and your next cup.

“We were pleased to contribute to a growing body of research which shows that alternative management options exist in agriculture that can be mutually beneficial for both crop production and biodiversity conservation,” said Morris. “Agroecological approaches like these will be increasingly necessary as society struggles to grow food more sustainably in a world threatened with climate change and other environmental challenges.”



FLASH FORWARD

Photo: Barton Davis Smith

If Forestry alumni Frank and John Craighead had a crystal ball, they would have seen their influence in the work of new SEAS faculty member Dr. Neil Carter

Neil Carter, who leads a team of researchers and resource managers supported by NASA and the National Park Service, uses remote sensing and satellite imagery to understand how artificial night light and human-made noise pollution affect predator-prey relationships. The team's work focuses on the fastest growing region in the United States—the Southwest.

The Southwest is mostly a very dark region at night, characterized from the sky by vast swaths of black. But the region's trajectory of rapid development has scientists and state agencies observing more and more nighttime illumination. Think of the night light from Vegas alone.

Starting with satellite imagery from NASA, the team realized they had a key secondary data source: GPS-collar data on mountain lions and deer collected by multiple agencies across state lines for 20 years. Compiling all of the long-term, high-resolution data into one regional analysis, Carter and company have discovered major

differences in predator-prey behavior that correlate with levels of light and noise pollution. The mountain lions seem to know that bright spots, like Salt Lake City, call for a unique style of hunting compared to more natural, dark areas like Capital Reef National Park.

"How cougars hunt their prey appears to be totally different in areas with highly elevated night light," said Carter. While cougars normally like to hunt in topographically complex landscapes like rocky mountainsides and crags, he found that in brighter areas, the cougars were hunting in flatter spaces farther away from forests. In fact, night-light levels were the strongest predictor of where cougars successfully hunted deer. "Those cougars are no different from their nature-dwelling counterparts in their attraction to food—but feeling vulnerable from the light, it appears they are more willing to wait for exactly the right (darkest) moment to pounce," he said.

Carter likes to use the words "coexistence" and "coadaptation" to describe the behavior changes he finds in animals and humans. "Cougars, deer, and people all must adapt to each others' changing behaviors," he said. "Those changes can alter food webs in unpredictable ways: Deer and cougars might change where and when they forage, in turn affecting vegetation patterns. The behavior changes might also have impacts on human-wildlife interactions, with deer-vehicle collisions increasing or decreasing in certain areas."

"Now is the time to be doing this research," said Carter. "If we wait until regional development stabilizes, it will be too late to conserve these natural processes and achieve human-wildlife coexistence."

Deep Roots: Carter's link to the famous Craighead brothers doesn't stop with remote sensing. As a SEAS master's student, he studied the migration patterns of Michigan black bears.



FOOD LITERACY FOR ALL PANEL, APRIL 2019

FOOD SYSTEMS

CHANGING THE GAME IN AGRICULTURE AND ACCESS

Feeding the growing human population in a sustainable fashion requires transforming food systems to be health-promoting, economically viable, equitable, and ecologically sound. Solving this challenge involves tackling issues around food production systems, food security, and food sovereignty at local, national, and global scales. The SEAS community responds by generating food security for human needs.

FOOD LITERACY FOR ALL

Launched in 2017, Food Literacy for All is an innovative course that is co-designed and co-taught by a team of U-M faculty and staff and community leaders in Detroit. Structured as an evening lecture series, the course features different guest speakers each week to address diverse challenges and opportunities of both domestic and global food systems. By bringing in national and global leaders, the program aims to ignite new conversations and deepen existing commitments to building more equitable, health-promoting, and ecologically sustainable food systems. The course is free and open to the public.

As community co-instructor Malik Yakini put it, “One of the most significant aspects of the Food Literacy for All course is that it modeled what a university-community partnership can look like.”

For most U-M students, Food Literacy for All is the only time in their academic career that they will sit in class next to farmers, nonprofit professionals, chefs, and other community members.

The list of Detroit-based community partners has grown each year, and now includes: Oakland Avenue Farm, the Detroit Food Policy Council, Food Lab Detroit, and the Detroit Black Community Food Security Network. This past winter, nearly 150 undergraduate and graduate students took the course for credit—the largest enrollment yet. Over 1,400 community members have attended the course since 2017.

Food Literacy for All was conceived and put into motion by Sustainable Food Systems Initiative program manager Lilly Fink Shapiro—who also designed and facilitates the popular Fast Food for Thought annual event, which brings 10 interdisciplinary faculty members from across campus to give a series of short (five-minute) talks on topics relating to food, agriculture, and diets.

MEAL KITS

Home-delivered meal kits contain pre-portioned—and sometimes partially prepared food ingredients and recipes—that allow consumers to easily prepare meals in their own kitchen. But what is their impact on the environment?

“I have a number of friends who really like ordering meal kits, but kept expressing guilt over all of the packaging,” said Shelie Miller, associate professor in Sustainable Systems and director of the undergraduate Program in the Environment (PitE). “The more I heard people assume that meal kits had to be terrible for the environment, the more I felt compelled to do a study that analyzed the whole system. I suspected that meal kits could actually be better for the environment. Due to the overall amount of food waste Americans generate at home, pre-portioned meal kits might actually combat food loss. Turned out my suspicion was right.”

Brent Heard, a doctoral candidate in Resource Policy and Behavior at SEAS, became lead author of the study, published in the

journal *Resources, Conservation and Recycling*, which Miller co-authored.

“Meal kits allow consumers to circumvent the grocery store retailing process, which reduces retail food loss and emissions from store retailing,” said Heard. “Meal kit delivery also optimizes the final ‘last-mile’ transportation of meals to the customer. And it is clear that pre-portioned ingredients (like those in meal kits) result in less food waste generated by a household.”



LINKING POULTRY FARMING WITH ANTIBIOTIC RESISTANCE

Rural communities in developing countries often adopt small-scale poultry farming as a means of income and source of protein. But the unintended consequence may be an increased antibiotic resistance in humans who consume broiler chickens that have been fed antibiotics.

Researchers conducted their two-year observational study in rural northwestern Esmeraldas, Ecuador.

“Our findings provide evidence that small-scale meat production operations have direct impacts on the spread and selection of clinically important antibiotics among underdeveloped settings,” said lead author and SEAS doctoral student Hayden Hedman.

The research, published in *The American Journal of Tropical Medicine and Hygiene*, is part of EcoDess, a larger, longitudinal study led by Joseph Eisenberg, a professor at the U-M School of Public Health.

BEYOND THE CARBON HOOFPRIENT

Beyond Meat’s “Beyond Burger” is marketed as “the world’s first plant-based burger that looks, cooks and tastes like fresh ground beef.” The company also points to the low carbon footprint of its products—compared to the heavy load of beef production.



Dr. Martin Heller, research specialist at the Center for Sustainable Systems, conducted a rigorous, peer-reviewed life cycle assessment to quantify the environmental impact of the production of the Beyond Burger through its distribution to retailers. His study found that compared to a ¼ lb. of U.S. beef, producing a ¼ lb. Beyond Burger requires:

- 99% less impact on water scarcity
- 93% less impact on land use
- 90% fewer greenhouse gas emissions
- Nearly 50% less energy

“It’s exciting to see the growth in plant-based alternatives to meat as over half of the greenhouse gas emissions associated with diets in the U.S. are due to meat production. Reducing the impact of our diets is climate action that is accessible to everyone because we all decide on a daily basis what we eat,” Heller said.

Heller’s study was recently highlighted in *The New York Times* “Quiz of the Week.”



WATER

CHANGING THE GAME IN THE GREAT LAKES AND GLOBAL AQUATIC RESOURCES

Lack of adequate water is a global crisis that affects more than a billion people worldwide. Sustainability challenges associated with population growth, climate change, land use, energy choices, and global poverty must be addressed to increase water quantity, availability, and quality around the world. The SEAS community responds by working to generate water security for human needs.

PHOTO: SEAS STUDENT HANQING WU (MS '20) PREPARES TO COLLECT DATA ABOARD A NOAA RESEARCH VESSEL AS PART OF HER MASTER'S PROJECT WITH COOPERATIVE INSTITUTE FOR GREAT LAKES RESEARCH.

GREAT LAKES ON THE RISE

Record high water levels in most of the Great Lakes this summer caused flooding and erosion in coastal communities, while inland, an overabundance of water threatened damage to storm water systems, sewer systems, roads, and bridges. While heavy precipitation is the major contributor to high water levels, lower evaporation rates—due to extremely cold winters—exacerbate the problem.

“In 2014, evaporation rates slowed down, and they slowed down drastically,” explained hydrologist and associate professor Drew Gronewold. “That led to a net increase in water levels across the entire region.”

“While fluctuations in lake levels are common, the excessive duration and intensity of the variabilities are likely connected to climate change,” related Gronewold. “These events are quite consistent with what scientists have been expecting,” he said.

As they prepare to meet the future, Gronewold and his colleagues are focusing on the ability to forecast events in a ladder of time scales—from five days out to 30 years. “We want to be able to provide predictions for citizens, for municipalities, and for other stakeholders in the region who make vital management decisions,” said Gronewold.

WHAT LURKS AT THE BOTTOM OF LAKE ERIE?

SEAS Assistant Research Scientist Casey Godwin described the first steps to understanding manganese cycling in Lake Erie:

“Our stakeholders for this work are water treatment plants along Lake Erie, where hypoxic or low-oxygen water can enter intakes bringing with it high levels of manganese, a heavy metal that can turn drinking water yellow. We’re working to pinpoint the conditions that trigger Lake Erie sediments to release manganese and how it is transported within the lake. To do this, we collect sediment cores and water from the bottom of the lake and bring them back to the laboratory where we hook them up to sensors, circulate the water via jets, and then, as sediments are essentially breathing and the oxygen in the water drops, we take samples to analyze for manganese.

“We’ve learned that manganese is released from the sediments more quickly than we anticipated and, after it is released, it can remain in the water for a long time. Now we are putting all of this together in a product that can help water utilities anticipate these changes in water quality and how it will impact their treatment process.

“The most pressing research need for addressing water sustainability is prediction.”

MASTERS PROJECT: GREAT LAKES BLUE COMMUNITIES

Enhancing community water stewardship in the Great Lakes Basin is a vital frontier of natural resource protection—especially during a time when federal and state governments are stepping back. While communities across the region are poised to take the lead, many of them lack a useful template for proceeding in ways that deliver environmental, community, and taxpayer benefits.

FLOW (For Love of Water), a water law and policy nonprofit organization committed to clean water for the Great Lakes, engaged a five-student master’s project team, advised by SEAS professor Paul Seebach, to promote tangible protection of waters across the Great Lakes Basin by creating a model Blue Communities initiative.

As part of that project, the student research team verified remotely sensed data on location (also referred to as “ground-truthing”) in the Grand Traverse region of northwest Lower Michigan. They also took an inventory of existing and emerging threats to critical community water resources, evaluated ideas for initiatives proposed by community members, conducted scientific, engineering and policy analyses—and ultimately, prepared a Great Lakes Blue Communities’ template that can guide plans, practices, and policies across the Basin.

The capstone master’s project, requiring an integrative approach drawing on science, data, modeling, legal protections, innovative land-use planning, and community engagement, necessitated collaboration both among the students and diverse stakeholders—and provided an opportunity to substantively inform public policy while setting a new precedent in Great Lakes protection.

Masters students Adam Arend (MS ’19), Lingzi Liu (MLA ’19), Kaitlin Vapenik (MS ’19), Nancy Ye (MS ’19), and Kangyu Yu (MLA’19) formed the Great Lakes Blue Communities project team.

POP QUIZ

HOW DOES GOLD MINING IMPACT FISHES IN THE GUIANA SHIELD OF NORTHERN SOUTH AMERICA?

- A) It changes the topography of their habitats by homogenizing the river bed
- B) It increases the turbidity and siltation altering availability of food resources
- C) It increases the toxicity of their habitats with the introduction of mercury contamination
- D) It alters the shoreline due to deforestation
- E) In other ways still being discovered by an interdisciplinary team of U-M researchers
- F) All of the above

SEAS Professor Dr. Karen Alofs, along with Dr. Hernán López-Fernández (LSA: Ecology and Evolutionary Biology) and Dr. Aline Cotel (Civil and Environmental Engineering), are measuring the effects of mining on the fishes in the upper Mazaruni River on the Guiana Shield. It’s possible that 95 percent of the fishes in this area are endemic species, found nowhere else in the world. Many of these species were unknown to science until recently and remain undescribed.

Bringing together expertise in conservation, fish biology, and hydrodynamics engineering, these researchers aim to fill a knowledge gap on the impacts of environmental disturbance on ecological communities in tropical rivers. Their findings will illuminate the complicated, interacting effects of mining in the region—with the ultimate goal of developing holistic, comprehensive, effective conservation and restoration recommendations. *F is correct (All of the above)*

RETURN OF THE CISCO



FISH FACTS: THE CISCO BELONGS TO THE SAME FAMILY AS SALMON AND TROUT (SALMONIDAE). THE COMMON NAME “LAKE HERRING” IS MISLEADING, BECAUSE IT IS NOT A MEMBER OF THE HERRING FAMILY (CLUPEIDAE).

Cisco once was the dominant native prey fish in the Great Lakes food webs. Populations plummeted between 1920 and 1970 due to overfishing, habitat loss, and interactions with invasive species. Today, habitat conditions are beginning to improve and key invasive species populations have declined. Fishery managers are now discussing what it might look like to restore cisco populations in Lake Michigan.

Although many stakeholder groups are interested in restoring cisco, they disagree on the best approach. Some advocate helping existing remnant populations recover, while others recommend stocking Lake Michigan with young cisco from elsewhere in the Great Lakes region. Still others note that ecological conditions in the lake have changed drastically and question whether cisco would still be viable as a self-sustaining population.

Associate Research Scientist Sara Adlerstein is leading a project to discover how restoration efforts can be tailored to fit the needs of the diverse groups of stakeholders. To understand the multiple perspectives, including potential areas of consensus or disagreement, the research team is running an integrated assessment—by interpreting existing data, holding workshops, and distributing an electronic survey. Along with her team of co-investigators, including Associate Professor Julia Wondolleck, Adlerstein hopes to “create a path” toward restoration.

“This research combines an understanding of the underlying natural science with social science,” said Adlerstein. “It’s the decision-making process that we’re trying to facilitate. That’s what makes this project unique. We’re working with an interdisciplinary team in current Great Lakes issues that have significant relevance to people.”



MAZARUNI RIVER



GREEN STORMWATER INFRASTRUCTURE

Stormwater runoff is a major contributor to water pollution from urban environments, collecting contaminants as it travels over rooftops and lawns through streets to lakes and streams. Meanwhile, the effects of local flooding and erosion, accelerated by climate change, threaten property as well as the safety of roadways. Conventional gray infrastructure pipes stormwater away from buildings, roadways, and sidewalks to keep them dry, but this does not mitigate pollutants or reduce downstream flooding.

Green stormwater infrastructure (GSI) can be designed to improve downstream water quality and mitigate flooding. Technically speaking, GSI is an approach to stormwater management that “uses vegetation, soils, and other elements and practices” to retain, detain, infiltrate, or evapotranspire stormwater where it falls. Through innovative landscape design, GSI can also deliver other environmental, social, and economic benefits.

Over the past five years, U-M researchers have used a design-in-science approach to work closely with the City of Detroit decision makers and residents to develop and implement GSI designs on vacant property in Detroit’s Warrendale neighborhood, and to assess how well these designs manage stormwater and also enhance the well-being of neighborhood residents.

Their project, “Neighborhood, Environment, and Water research collaborations for Green Infrastructure”

(NEW-GI), is led by SEAS professor Joan Nassauer. Her team includes SEAS colleagues Allen Burton and Catherine Riseng, along with colleagues from multiple disciplines at U-M, U-M-Dearborn, and Wayne State University.

Launched in 2014, project collaborators, including the Detroit Water and Sewerage Department (DWSD), developed bioretention flower garden designs and constructed two research designs on four pilot sites, which were vacant property owned by the Detroit Land Bank Authority. Then, over the next five years, the team monitored stormwater flows and water quality on the sites and surveyed neighborhood residents before and after construction to investigate how a wide array of GSI designs might affect their well-being and their investment in their homes. The team also visited cities around the country to investigate governance for converting vacant property to GSI and maintaining GSI.

“Our close coordination with DWSD and other City departments, and our collaboration with spectacular, generous neighborhood leaders, has made this research highly motivating for all of us who bring insights from different disciplinary backgrounds,” said Nassauer.

Based on this work, the team developed guidance for GSI development on vacant property in Detroit and other American post-industrial cities. Their most recently published report, *Green*

Stormwater Infrastructure on Vacant Land: Integrated Assessment with Implications for Detroit, conveys good news for potential GSI solutions: 1) The pilot sites manage stormwater flows and remediate pollutants very effectively. 2) Residents appreciate the pilot bio-retention gardens even more highly two years after construction, and measures of their sense of well-being and safety relate to key, replicable garden characteristics.

The report concludes that, toward becoming an equitable, green city, Detroit could implement GSI not only to manage stormwater but also to provide cleaner, safer, healthier, and more walkable neighborhoods.

NEW-GI Researchers:

Joan Nassauer (U-M SEAS), **Alicia Alvarez** (Michigan Law), **Allen Burton** and **Catherine Riseng** (U-M SEAS), **Margaret Dewar** (U-M Urban Planning), **Shawn McElmurry** (Wayne State, Engineering), **Natalie Sampson** (U-M Dearborn, Health and Human Services), **Amy Schulz** (U-M Public Health), **Noah Webster** (Institute for Social Research)

The University of Michigan Water Center supports NEW-GI with a grant from the Erb Family Foundation.

ABOVE PHOTO (from left to right):

Noah Webster, Nat Lichten (MS '15), Rachel Leonard (MLA/MUP '18), Lanfei Liu (MLA/MS '17), Sanaz Chamanara (MLA '17), Natalie Sampson, and Joan Nassauer

Climate Change, Hollywood Style



Dystopian films based on climate-inspired sci-fi, or “cli-fi,” as the genre has come to be known, reveal a terrifying End of the World as We Know It. To learn which films hold a grain of truth in their vision of the future, CNN asked leading climate scientists, including SEAS Dean Jonathan Overpeck, to weigh in on some of their favorite cli-fi. Here are a few outtakes from the dean’s remarks:



THE DAY AFTER TOMORROW (2004)

Disruption of the North Atlantic Ocean circulation abruptly plunges the planet into a new Ice Age. The unheeded whistleblower, a paleoclimatologist (like Dean Overpeck), makes a daring trek in the path of a Super-Blizzard to save his son.

“Although the ocean circulation can slow, change wouldn’t happen overnight, and it’s unlikely to spark a new Ice Age. But paleoclimatologists do rock!”

SNOWPIERCER (2013)

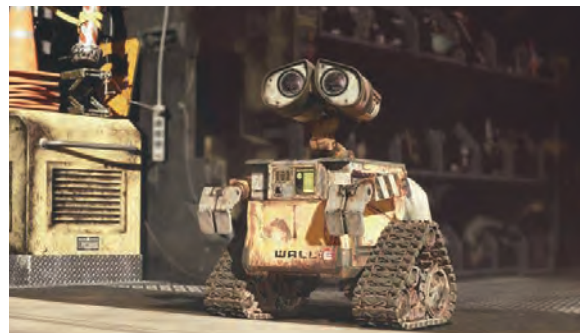
Geoengineering designed to reverse global warming grossly overcompensates, creating a frozen “Snowball Earth” in which the only survivors must ride a train that eternally circles the globe.

“We may never know enough to geoengineer safely, but the potential for other mistakes more deeply trouble climate scientists, for example—triggering severe droughts and famines in sensitive parts of the planet.”

MAD MAX: FURY ROAD (2015)

A post-apocalyptic planet is ravaged by climate change, ecological collapse, and a scarcity of water and gas.

“This film, intentionally or not, hits home accurately with climate science. And the emphasis on gas-powered cars and trucks strike a real irony—to the end, humans rely on the very fossil fuel that has destroyed their world.”



WALL-E (2008)

Animated film featuring a trash-compacting robot left to clean a garbage-strewn planet Earth—after humans have fled to space.

“One key message of ‘WALL-E’ is that there is hope. But do we really want to envision living in space as a viable solution when all we have to do is move beyond fossil fuels and use available knowledge to chart a more sustainable future for our planet?”



MCITY LAUNCHES DRIVERLESS SHUTTLES ON U-M'S NORTH CAMPUS (2018)

U-M MOVES TOWARD CARBON NEUTRALITY

The University of Michigan has taken an important step toward its goal of carbon neutrality by charging a core team to develop recommendations on how to get there, as well as advance scalable and transferable strategies that can be used by other institutions and larger communities to achieve the same goal.

The U-M President's Commission on Carbon Neutrality, and its advisory panels, are bringing together the U-M community and regional partners to develop recommendations for reducing U-M's carbon emissions to levels that are environmentally sustainable, achieved in a fiscally responsible manner, and in the context of its mission of education, research, service, and patient care.

The scope of the president's charge spans the Ann Arbor, Flint, and Dearborn campuses, and includes, but is not limited to: carbon emissions and sequestration; energy sourcing; technology development and policy change; facilities, operations and mobility; and behavioral change.

"Human-influenced global climate change is the defining scientific, social, and environmental problem of our age, and the University of Michigan is poised to be a significant part of the solution," President Mark Schlissel said in a message to the university community.

"The commission is designed to marshal the intellectual resources and commitment of the U-M community to contribute to a more sustainable and just world. Commission members will engage broadly within the U-M community and with regional experts and partners," said Schlissel.

SEAS Dean Jonathan Overpeck and Greg Keoleian, SEAS professor and director of Center for Sustainable Systems, both accepted appointments on the commission, which includes faculty, students, administrators, and local partners.

"I look forward to working with our SEAS community as the process proceeds," said Overpeck. "We know that countless great ideas and solutions will come from our SEAS community, and we are listening. Moreover, I hope the entire SEAS community will work with us to make this initiative a wild success not only on our campus, but also across our state and beyond. This is a tremendous opportunity for us to move the needle in society toward a more sustainable future for generations to come."



RISE TO THE CHALLENGE

In 1970, U-M held a massive "Teach-In on the Environment" organized by U-M students, which drew more than 50,000 people. The Crisler Arena kickoff had an overflow crowd who gathered to hear Ralph Nader, Edmund Muskie, Sens. Gaylord Nelson and Phil Hart, Governor William Milliken, ecological leaders, CEOs of companies, scientists, television stars and performers. *The Michigan Daily* estimated that there were over 125 events, including four large rallies and dozens of workshops across campus and at Ann Arbor high schools.

Five weeks later, on April 22, the first Earth Day was celebrated nationwide—building on the momentum generated by the U-M Teach-In on the Environment.

As we mark the 50th Anniversary of these founding Earth Day events, concerns about our environment are more urgent than ever. U-M is dedicating this year—Earth Day at 50—to bring campus and community partners together at events, lectures, exhibits, and more—to assess our progress on meeting sustainability goals, and explore new ways that we can rise to the challenge of creating a better future for our planet.

SAVE THE DATE: March 12, 2020
Earth Day at 50 Commemorative Event
Check: earthday.umich.edu

#A2EARTHDAY

VICTORS CAMPAIGN

FINAL REPORT

The Victors for Michigan Campaign (V4MC), which wound down last academic year, was a great success for SEAS. The Development and Communications teams are pleased to share some of the results along with our plans for the future.

It has been a time of transition and reenvisioning at SEAS. During the V4MC campaign, we realized our \$37.2 million fundraising goal and secured 43 gifts of \$100,000 or more. We are now stewarding more than 110 endowment funds, most of which are designated for “student support.” We are well positioned for the next major university-wide fundraising effort, and continue to engender an exciting and positive major gift fundraising culture.

Our Communications team is working closely with the Michigan Creative team to build a new university website—focused on environmental sustainability—that will be a critical platform for articulating the university’s work in key theme areas. With Dean Overpeck’s appointment, the strong leadership of the Dean’s External Advisory Board, the expanded SEAS mission, and a greater focus throughout the university for environmental sustainability, we are confident that SEAS will be a leading force in growing even more support for this environmental mission and in significantly advancing the university’s sustainability work for our planet and for generations to come.

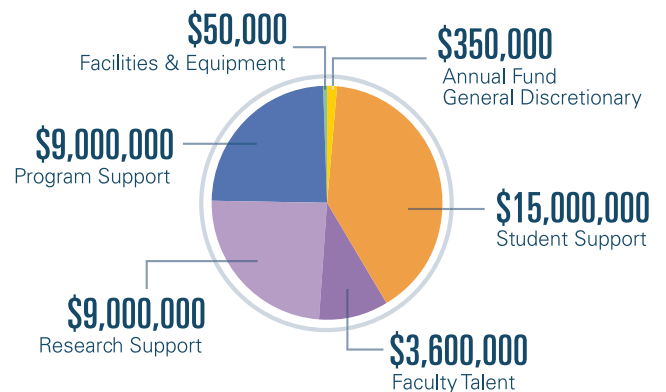
\$37.2

MILLION DOLLARS RAISED

2,284

**TOTAL DONORS
CONTRIBUTING TO
SEAS DURING THIS
CAMPAIGN**

CAMPAIGN OBJECTIVES REALIZED

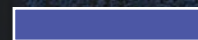


SOURCES OF FUNDING

\$22.5 MILLION
FROM ALUMNI



\$9.4 MILLION
PROFESSIONAL FOUNDATIONS THROUGH 17 GRANTS



\$5.3 MILLION
OTHER





DR. DORCETA TAYLOR DELIVERS THE MLK LECTURE (2013)

ACCOLADES

Professor Rosina Bierbaum

was one of two U-M faculty elected to the National Academy of Sciences this last spring in recognition of achievements in original research. She also earned the President's Award for National and State Leadership from U-M President Mark Schlissel for her significant public engagement in science policy.

Professor Bob Grese

has been named a fellow of the American Society of Landscape Architects (ASLA) and Council of Educators in Landscape Architecture (CELA) for his outstanding accomplishments as a landscape architecture educator.

Professor Ivette Perfecto

was appointed by U-M President Mark Schlissel as a senior fellow in the Michigan Society of Fellows, where she will mentor emerging scholars across U-M. The Michigan Society of Fellows provides financial and intellectual support to individuals selected for professional promise and interdisciplinary interests.

Professor Tony Reames

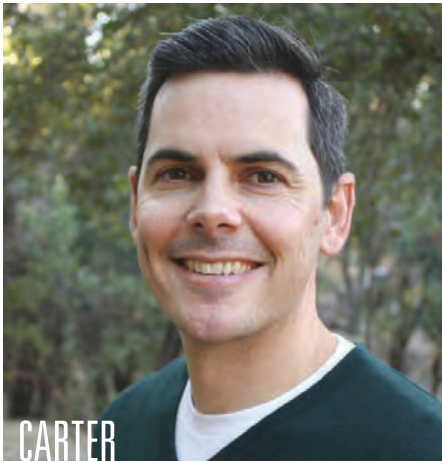
has been selected as a JPB Environmental Health Fellow by Harvard University's T.H. Chan School of Public Health. Reames was also chosen as one of the recipients of Midwest Energy News' 2019 "40 Under 40," an awards program that highlights emerging leaders throughout the region and their work in America's transition to a clean energy economy.

Professor Dorceta Taylor

received the Sustainable Community Champion Award from Detroit-based nonprofit EcoWorks for exemplary leadership in energy efficiency, sustainable building practices, and community development.

Professor Michaela Zint

was named a Thurnau Professor for her outstanding contributions to undergraduate education. Zint was one of five faculty members campus-wide to earn the distinction in 2019, which also includes a \$20,000 grant to support continued work in teaching.



Neil Carter

is an assistant professor of environment. His interdisciplinary research examines the complex dynamics that characterize interactions between wildlife and people in a global change context. Using these methods, he addresses diverse issues related to the electric power sector and climate change.



Michael Craig

is an assistant professor of environment and sustainability. He focuses on applied research that blends economic, policy, and technology-driven methods. Using these methods, he addresses diverse issues related to the electric power sector and climate change.



Drew Gronewold

is an associate professor and holds an adjunct appointment in the U-M Department of Civil and Environmental Engineering. His research interests lie in hydrological modeling, with a focus on propagating uncertainty and variability into model-based water resources management decisions.



Sara Hughes

is an assistant professor who focuses broadly on the politics and governance of urban sustainability transitions, and particularly the pursuit of sustainable urban water management practices. She investigates the political and institutional dimensions of urban water governance, policies, and management practices, focusing primarily on North America.



Derek Van Berkel

is an assistant professor of data science, geovisualization, and design. His research examines the human dimensions of land-cover/land-use change and ecosystem services at diverse scales. It aims to use spatial analysis and geovisualizations of social and environmental data and spatial thinking to develop solutions for today's most pressing environmental challenges.



Brian Weeks

is an assistant professor, conservation ornithologist and an evolutionary ecologist who studies the assembly of biological communities, and how different assembly histories can impact biotic responses to global change. He integrates his training in systematics and community ecology to examine community-level biotic responses to global change.

Michigan Environmental Justice Summit 2020

FEBRUARY 13, 2020:

Commemorating the 30th anniversary of Michigan's Conference on Race and the Environment & Looking Towards the Future

Where is environmental justice headed today? How can YOU make an impact? Join us for a dynamic panel discussion featuring environmental justice game changers.

THE SUMMIT 2020 PANEL:

Robert Bullard

Known as the "Father of Environmental Justice"

Rhiana Gunn-Wright

Policy Director, New Consensus

One of the architects of the Green New Deal

Charles Lee

Senior Policy Advisor, Environmental Protection Agency

Michelle Martinez (MS '08)

Coordinator, Michigan Environmental Justice Coalition

Regina Strong

Michigan Department of Environment, Great Lakes and Energy

EIGHT ALUMNI HAVE BEEN RECOGNIZED FOR CONTRIBUTIONS TO THEIR FIELDS

The Association of Public Land-Grant Universities recognized **Rebekah VanWieren (MLA '09)** with the Western Region Award for Excellence in Teaching for her passionate efforts in teaching the next generation of landscape architects. VanWieren is an assistant professor in the Department of Plant Sciences and Plant Pathology in Montana State University's College of Agriculture.

Sadik C. Artunç (MLA '79) was named president-elect of the Council of Educators in Landscape Architecture. Artunç currently serves as the department head of landscape architecture at Mississippi State University.

Thomas L. Mroz (MLA '86) was named president-elect of the American Society of Landscape Architects. Mroz is a senior vice president with the integrated design firm SmithGroup in Ann Arbor.

Two MLA alumni recently became fellows of the American Society of Landscape Architects: **Robert Gibbs (MLA '84)** was recognized for broadening the understanding and respect for landscape architects by the public, real estate industry, and related professionals; and **Lisa Delplace (MLA '98)** was recognized for a career that spans four decades that furthers the connection between people and nature.

Paul Coseo (MLA '04), assistant professor and sustainability scientist at Arizona State University's The Design School, has been named Educator of the Year by the Arizona Chapter of the American Society of Landscape Architects. The award recognizes an educator dedicated to promoting art and design's ability to advance environmental stewardship.

Beatriz Cañas (MS '15) has been honored as one of this year's North American Association for Environmental Education Top 30 under 30, which recognizes 90 individuals from around the world who are making a difference through environmental education. Cañas is the program manager for the Science Career Continuum at the Chicago Botanic Garden.

Michelle Martinez (MS '08) coordinator of the Michigan Environmental Justice Coalition and the executive director of Third Horizon Consulting, received the Sustainable Community Champion Award from Detroit-based nonprofit EcoWorks. The award recognizes individuals and organizations in Southeast Michigan who demonstrate exemplary leadership in energy efficiency, sustainable building practices, and community development.



JONATHAN W. BULKLEY

(1938 - 2019)

Jonathan W. Bulkley, Peter M. Wege Endowed Professor Emeritus of Sustainable Systems, died peacefully on July 14, 2019, at home with his wife Trudy, and dog, Maggie, by his side. Professor Bulkley was a beloved member of the SEAS, U-M, and Ann Arbor communities and his presence will be missed by the many who knew him.

In the late 1980s, collaboration with Greg Keoleian, then a recently minted Ph.D. and now a SEAS professor, led to the establishment of what was then known as the National Pollution Prevention Center, and eventually became the Center for Sustainable Systems. Bulkley also was the first faculty member to be named the Peter M. Wege Professor of Sustainable Systems.

During his 43-year career at U-M, Professor Bulkley educated thousands of students, served on numerous university committees and on state-wide and national scientific committees, and published widely in the areas of resource policy and sustainability in water resources.

Upon his retirement as professor emeritus in 2011, Bulkley had these words for the U-M community:

"I want to emphasize that it's been a privilege to work with so many bright men and women all these years," he said. "It's been a really good run."

REMEMBERING DR. BULKLEY

"Jonathan loved Bach, as so many mathematically inclined do. The words associated with one of his favorites—'Jesu, Joy of Man's Desiring' personify Jonathan: 'Fire of life impassioned, Striving still to truth unknown.' Jonathan never lost his passion for life or his search for truths still unknown."

— **Rosina Bierbaum**, Professor

"Jonathan was a person who was comfortable with his situation, not egotistical about his accomplishments, and strong in his commitment to the university. I'd see him walking through the halls of the Dana Building wearing a white shirt and bow tie, saying hello to everyone he encountered with a slight bow."

— **Jim Diana**, Professor Emeritus

"If we had to sum up Jonathan's career in a few words, I would say Jonathan Bulkley was a true gentleman and a scholar who advanced sustainability through his water policy research, the many students and future faculty that he trained, the policies he championed, and his unwavering support of his colleagues and staff to enable their success."

— **Greg Keoleian**,
Professor and Director of the Center for Sustainable Systems

"Jonathan Bulkley was the best example of all that Michigan stands for. He was very committed to his home state, his home town, and the Great Lakes region. Jonathan achieved at the highest scholarly levels, but he was also engaged with the world and he made a difference."

— **Mark Van Putten**, Executive Director of The Wege Foundation

"I became one of Jonathan's first master's students, and worked for him as an RA and as his TA in water policy, a course he taught for more than 40 years. He was a great mentor, gently guiding, valuing my perspectives, operating in a manner that leveled the power differences between professor and student and always, always, wanting the very best for you."

— **Steve Yaffee**, Professor



University of Michigan School for Environment and Sustainability
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2019 SEAS NEW STUDENT ORIENTATION

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