UNIVERSITY OF ALBERTA

WINTER 2024

RENEW

Department of Renewable Resources

TERRITORIAL ACKNOWLEDGEMENT

The University of Alberta acknowledges that we are located on Treaty 6 Territory, and respects the histories, languages, and cultures of First Nations, Métis, Inuit, and all First Peoples of Canada, whose presence continues to enrich our vibrant community.

Photo credit: René Belland

Contents

Chair's Message

Welcome to the Department of Renewable Resources, where our commitment to knowledge, innovation, and sustainable practices shapes the future of environmental and conservation sciences, agriculture, soil sciences, and forestry. We are more than just an academic institution; we are a vibrant community driven by a shared passion for positively impacting our world.

The department offers incredible choices and opportunities for undergraduate and graduate students to choose from rich courses and a large breadth of our faculty research interests. We resolutely believe that excellence in research leads to effective teaching, and the inherent effort of explaining complex and emerging environmental issues leads to new research and teaching opportunities. Our students are integral to learning in the department, and we maintain high standards for our instructors and students. Our students are challenged to think critically, conduct groundbreaking research, and develop the skills needed to address the most pressing challenges of our time.

At the heart of our department's excellence lies our commitment to research that matters. Our faculty members are at the forefront of their disciplines, pushing the boundaries of knowledge and pioneering innovative solutions to complex issues in the natural sciences. They have garnered prestigious awards, conducted groundbreaking research, and published influential works that have reverberated far beyond our campus.

Their research has illuminated new avenues for sustainable agriculture, forestry, and environment and conservation, and advanced our understanding of natural resources. These achievements honour our department and serve as a source of inspiration for our students. We will continue to provide them with the resources, infrastructure, and collaborative opportunities needed to drive their research forward. Doing so ensures that our department remains at the forefront of environmental research and education.

Our faculty's impact extends well beyond academia. They actively engage with government agencies, industry partners, and community organizations, translating their research into practical solutions. Their expertise is sought after in advising on critical natural resource management, and they play a pivotal role in solving emerging problems for our province and beyond. These relationships provide unique opportunities for students to bridge the gap between theory and practice. Through internships, fieldwork, and collaborative projects, students gain valuable hands-on experience and build a network of contacts that will serve them well throughout their careers.

"Our faculty's dedication to mentoring the next generation of scientists and leaders truly sets our department apart."

Nadir Erbilgin

Our faculty's dedication to mentoring the next generation of scientists and leaders truly sets our department apart. They invest their time and energy in nurturing the talents and passions of our students, guiding them toward their own paths of excellence. Many of our graduates have achieved great success in their careers, a testament to the quality of education and mentorship provided here.

We are committed to continuous growth and change as we look to the future. We recognize the emerging challenges facing our natural resources and are actively working to expand our expertise in climate change mitigation and biodiversity conservation. We aim to remain at the forefront of natural resource management research and education, preparing our students to be leaders and innovators in their chosen fields. As we look ahead, our department remains committed to supporting our faculty in pursuing knowledge and innovation.

As a chair, one of my priorities is to build further on the department's academic strengths while also addressing a lack of critical mass in some of the emerging fields, such as Indigenous resource management. My strategy is to tap into unique resources and help build synergies within and between departments to bring in new hires and expand resources. Furthermore, engagement with external stakeholders in agriculture, forestry and environment sectors is critical for fostering innovation.

In closing, I invite you to immerse yourself in the world of the Department of Renewable Resources. Explore our website, discover our programs, and connect with our passionate faculty and staff. Join us on a journey of intellectual discovery and personal growth, where your contributions will help shape a more sustainable and resilient future for all.

NADIR ERBILGIN
Professor and Chair
Department of Renewable Resources
erbilgin@ualberta.ca

Academics

Undergraduate Programs

BSc in Environmental and Conservation Sciences

MAJORS

- Conservation Biology
- Environmental Economics & Policy
- Human Dimensions of Environmental Management
- Land Reclamation
- Northern Systems (A shared initiative with Yukon University)
- Wildlife & Rangeland Resources Management

BSc in Environmental & Conservation Sciences & BA in Native Studies (5 years)

A shared initiative of ALES and the Faculty of Native Studies.

BSc in Forestry

BSc in Forest Business Management

A shared initiative of ALES and the Alberta School of Business.

BA in Environmental Studies

A shared initiative of ALES and the Faculty of Arts

CONCENTRATIONS

- Culture, Society, and Peoples of Canada
- Food and Society
- Politics, Society and the Global Environment

Graduate Programs

Course-based and thesis-based master's and doctoral programs offered include:

- MSc, MBA/MAg in Agriculture and the Environment
- MSc, PhD in Conservation Biology
- MSc, PhD in Environmental Soil Science
- MSc, MBA/MF, PhD in Forest Ecology and Management
- MSc, PhD in Reclamation and Restoration of Land and Water

NEW

- MF Sustainable Forest Management
- MF Specialization in Environmental and Wildlife Conservation
- MF Specialization in Ecology and Ecosystem Restoration
- MAg Conservation and Restoration of Land and Water

Our work through our stories

From cutting-edge research labs, to the vast fields where hands-on learning takes root, these stories showcase the dynamic work of exploration and education in renewable resources.

Each story embodies the spirit of discovery, passion, and dedication that defines the department, highlighting the collaborative efforts of students, faculty members, and researchers as they cultivate solutions to global challenges.

Photo credit: Getty Images

Tree Diversity Increases Carbon Storage and Soil Fertility in Forests

Keeping tree diversity intact in Canada's forests over the long term can help increase carbon capture and mitigate climate change, according to a new study that could help guide conservation and reforestation efforts by government and industry.

The study is the first of its kind to show the sustained benefits of tree diversity on a large spatial scale in terms of storing carbon and nitrogen in the soil. It reinforces the importance of biodiversity conservation in forests, says Xinli Chen, lead author of the paper and postdoctoral fellow in the Department of Renewable Resources.

"Conserving tree diversity is a valuable tool in mitigating climate change, particularly in enhancing carbon storage in soil," he says.

While it's already been established that increasing soil carbon and nitrogen storage can help ease the effects of climate change and sustain soil fertility, global stocks of both elements have declined substantially due to factors like forest fires, deforestation and land use change, he notes.

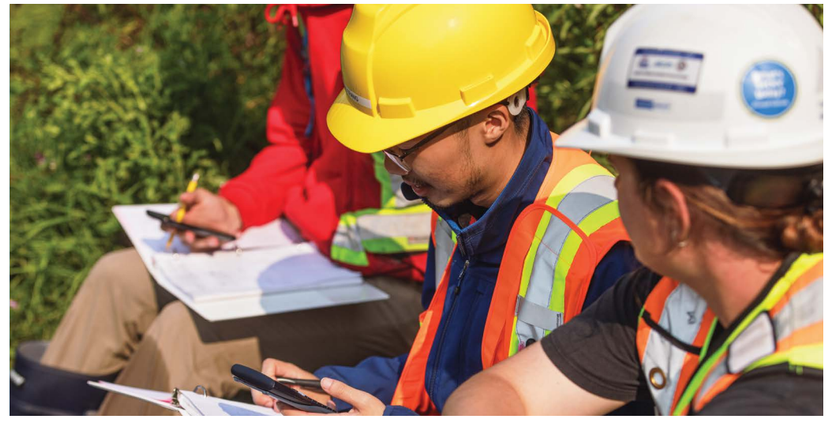
Conserving and promoting tree diversity in forests can help increase the levels of soil carbon and nitrogen, he says.

The researchers analyzed Canada's National Forest Inventory database and used statistical modelling to provide new evidence of a link between greater tree diversity and higher soil carbon and nitrogen accumulation in natural forest ecosystems over decadal time scales, meaning a time scale over 10 years or longer.

"Conserving tree diversity is a valuable tool in mitigating climate change, particularly in enhancing carbon storage in soil."

Xinlin Chen

Photo credit: Getty Images



ALES Field School
Photo credit: Supplied

The work, done in collaboration with scientists from Canada, Japan and the United States, confirms collective findings from previous experiments that manipulated plant diversity, notes study co-author Scott Chang, a soil scientist in the renewable resources department.

The findings can "help guide growing efforts to use forests for carbon sequestration by protecting and enhancing tree species diversity, which will at the same time benefit the productivity of forests today and in future," Chang notes.

Photo credit: René Belland

Little Mosses Play Big Role in Three-Day Workshop

Walking through the forests of Alberta, it's common to spot green fluffy mosses on the forest floor or clinging to trees. However, dozens of tiny mosses tucked between plants and rocks are often only visible with a magnifying glass.

René Belland, who has studied mosses for 37 years, teaches a three-day workshop where environmental professionals learn to identify these elusive species, a useful skill for surveys of rare plants.

Though tiny in size, mosses play a significant role in many ecosystems. For example, their sponge-like characteristics help maintain soil moisture by soaking up and slowly releasing rainwater. Mosses are also useful bioindicators: their presence or absence from a site provides valuable intel about an ecosystem's health.

During the Introduction to Mosses workshop, participants gain foundational knowledge through a lecture, learn to identify up to 45 mosses in the lab, and then head outdoors to locate the species in the Edmonton River Valley.

One of Belland's favourite parts of the workshop is witnessing a participant's awe when they get a close-up look at a moss for the first time.

"When you see a person look at a moss through a hand lens, their eyes light up, and they appreciate the simple beauty of the organism," says Belland.

MORE INFORMATION

Register for *Introduction to Mosses* at: **https://app.groupize.com/e/an-introduction-to-mosses-of-alberta**

Uwe Hack | Photo credit: Supplied

Uwe Hacke: Shifting From Research to Photography

Uwe Hacke is putting away his lab coat and picking up his camera as he embarks on a new chapter in his life – retirement. After 16 years with the Department of Renewable Resources, Hacke plans to express his deep love of nature through photography rather than research and teaching.

An unwavering curiosity for plant design and anatomy drove Hacke's academic career. He investigated how the vascular transport systems of plants enable water and nutrients to move between roots and leaves. Hacke studied these systems in various species, focusing on tree physiology. His insights into how tree vascular systems function and respond to drought and rising temperatures in a changing climate contribute to the management of future forests.

In 2017, the Canadian Society of Plant Biologists recognized the significance of Hacke's research with the David J. Gifford Award in Tree Physiology. He was Canada Research Chair (Tier 2) in Tree-Water Relations from 2007-2016.

Beyond research, Hacke inspired hundreds of students with his passion for plant biology. John Spence, professor emeritus, describes Hacke as one of the department's brightest stars. "His light spoke for him more than his voice," says Spence. "Our department was a better place for having him."

Embedding Indigenous Knowledge and Perspectives Into Research

Engaging Indigenous Peoples in research is essential to building and nurturing positive relationships with Indigenous communities. However, researchers often lack clear guidelines on how to build these relationships. To help address this gap and work toward the University of Alberta's commitment to reconciliation, the Department of Renewable Resources is participating in the university's Indigenous Research Strategies Task Force and seeking meaningful ways to incorporate Indigenous knowledge and perspectives into the curriculum.

Supporting the University of Alberta Indigenous Strategic Plan, the goals of the task force include developing policies and procedures to guide ethical engagement with Indigenous communities and establishing programs and resources to embed Indigenous knowledge and perspectives into research.

"Previously, we didn't have any protocols on how to ethically engage with Indigenous communities, even when we are working on their land and issues related to them," says Nadir Erbilgin, professor and department chair and a task force member.

In addition to a research ethics framework that will be developed collaboratively with Indigenous communities, the task force is working toward establishing an Indigenous Research Advisory Council to identify how to incorporate Indigenous involvement in all stages of research and appointing research chairs in Indigenous Ways of Knowing/ Knowledge systems.

Numerous professors in the department are taking steps to include Indigenous knowledge and perspectives in their courses. For example, Elder Melody Lepin spoke as a guest speaker in associate professor David Olefeldt's second-year Water Resources Management course, which includes a section on Indigenous perspectives. Hearing directly from an elder allowed students to learn about roadblocks that hinder collaboration with Indigenous communities and examples of when Indigenous perspectives have been incorporated.

MORE INFORMATION

More information on the task force and the university's commitment to reconciliation are available in the **University of Alberta Indigenous Strategic Plan**.

Photo credit: Jen Beverly

A New Tool for Mitigating Wildfire Damage

Recognizing that climate change makes it increasingly difficult to predict wildfire behaviour, the Wildfire Analytics Lab has developed a tool that indicates where a wildfire is most likely to enter a community.

That piece of information can be vital, says Jen Beverly, associate professor with the Department of Renewable Resources, noting that the disastrous wildfires that devastated the communities of Lytton in 2020, Fort McMurray in 2016 and Slave Lake in 2011 were all driven by wind and burned along a specific pathway.

By using the new tool, developed by a team led by Beverly and PhD student Air Forbes, communities can take preventative measures such as managing or removing fuel, better protecting infrastructure and planning evacuation routes.

"If a community is surrounded by a high level of hazardous fuels, then fires can come at them from a lot of directions," says Beverly. "Mitigation may not be the best option for these areas, but it is much more manageable if the community's vulnerability comes from just one direction."

Beverly believes that when it comes to wildfire research, we must shift our focus from fire predictability to preparedness.

"Climate change has left us in a position of incredible uncertainty — historical data that occurred under completely different conditions and ecosystems can't be relied upon to tell us what to expect. We need to focus on what we can do to keep people safe, rather than trying to endlessly predict something that isn't predictable."

MORE INFORMATION

More information about the tool is available in the journal **Natural Hazards**.

Guillermo Hernandez Ramirez, Camila Quiroz | Photo credit: Supplied

Stacking up for Sustainability: Combining Food Growth with Solar Energy Production

Reducing the human footprint on the landscape while producing enough food and energy for a growing population requires creative solutions. That's why a student's presentation on agrivoltaics piqued the interest of Guillermo Hernandez Ramirez, professor and director of graduate studies in the Department of Renewable Resources.

In its simplest form, agrivoltaics combines agriculture and solar energy production in the same space. To demonstrate this, hold your hands in front of you. Imagine that your left hand is a thick, green, leafy bed of spinach. Your right hand is a solar panel absorbing and converting sunlight into electrical energy. Both the spinach and the solar panels require sunlight, but side by side, they take up quite a bit of space. Now, slide your right hand over your left hand. Your solar panel is still fully exposed to the sunlight it needs to charge its cells, but the leafy bed of spinach is now covered. However, this can help create the cool, moist soil conditions best for growing spinach while allowing enough sunlight to escape through your solar panel fingers to the crops below. An additional benefit is that the underlying spinach can have a cooling effect on the solar panels, helping the panels maintain an optimal temperature for efficient energy production.

To explore the emerging field of agrivoltaics, Hernandez Ramirez and student intern Camila Quiroz conducted a 25-day experiment to assess plant growth and electrical output.

They used a growing chamber to measure spinach growth under two different thicknesses of solar panels, compared to growth with no panel. They also measured how much electricity each type of panel produced. The results show that, though the

panels slowed plant growth, it was possible to produce plants of desirable harvest size while consuming 17 per cent less water, potentially benefiting areas with limited water supplies. The solar panels produced enough energy to power personal devices or small electronics.

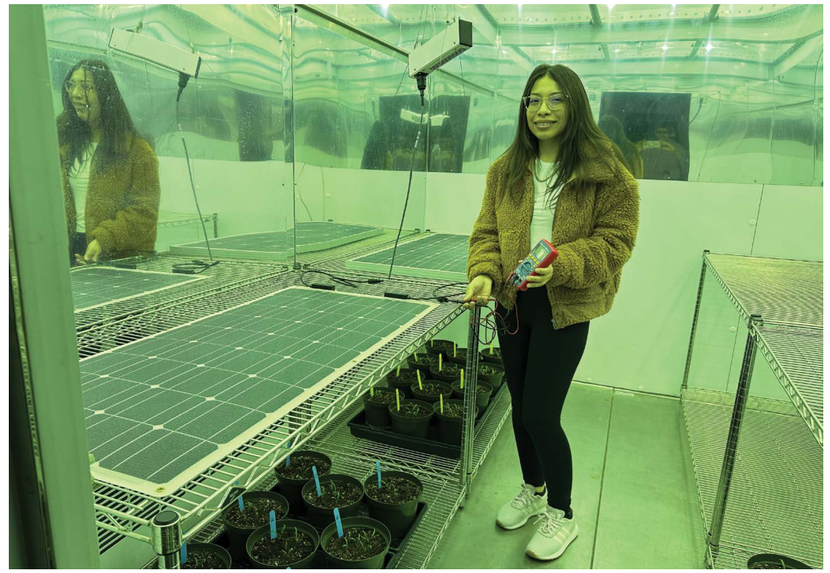
Hernandez Ramirez sees value in people being more connected to the resources they consume. "People can grow their own food while creating the energy they need to power their phones and devices," says Hernandez Ramirez, "and this creates a unique way for people to experience where these valuable resources come from."

From massive solar panel projects and large-scale food production to in-home use, integrating agriculture with energy production provides a creative solution to issues like food security and moving toward more sustainable energy sources.

Possible future experiments include testing different varieties of crops, types and arrangements of solar panels and field experiments to learn how plants and panels interact with conditions like rain and temperature changes.

"People can grow their own food while creating the energy they need to power their phones and devices."

Guillermo Hernandez Ramirez



Camila Quiroz
Photo Credit: Supplied

Photo credit: Supplied

Forestry and Agriculture Hold Highest Potential for Mitigating Climate Change, says Expert Panel on Nature-Based Climate Solutions

With global temperatures on the rise, Environment and Climate Change Canada called on some of the country's top experts to weigh in on the potential for nature-based climate solutions (NBCSs) to help meet Canada's greenhouse gas emission reduction targets.

David Olefeldt, associate professor in the Department of Renewable Resources and Vic Adamowicz, vice-dean of the Faculty of Agricultural, Life & Environmental Sciences, were among the 15 panel members who contributed to the assessment and the final report published by the Council of Canadian Academies.

Natural solutions to remove carbon from the atmosphere can include action to protect, manage and restore both managed and unmanaged ecosystems. Olefeldt says the panel looked at increasing carbon storage within ecosystems and avoiding emissions through ecosystem conservation.

The panellists evaluated the mitigation potential of nature-based climate solutions across four ecosystems: forests, agriculture and grasslands, freshwater wetlands and coastal zones. They considered the size of the area, the timeframe for NBCSs implementation and the net sequestration of each on a per-hectare basis. The expert panel also considered the potential impacts or risks of nature-based climate solutions and the costs and barriers to implementing them in Canada.

The panel's findings indicate that Canada's greenhouse gas emissions could be educed by about six per cent if all NBCSs identified were fully implemented, an important contribution toward Canada's commitment to reduce its emissions to at least 40 percent below 2005 levels by 2030.

However, the panel concluded that natural-based climate solutions should not be the primary avenue for Canada's greenhouse gas emission reductions, noting that successfully implementing NBCSs would require robust policies that are not currently in place.

Forest and agriculture management areas hold the highest potential for mitigating climate change through NBCSs, says Olefeldt.

"These are areas where policies can be implemented and affect large areas of opportunity," he says, "but the policy side can be challenging."

In addition to the need for aggressive policy change, the report highlights the important role of Indigenous leadership in implementing nature-based climate solutions. Canada's carbon stocks benefited from Indigenous stewardship for millennia, and Indigenous knowledge and involvement are crucial to any future sequestration actions on their traditional territory.

MORE INFORMATION

The report is available on the council's website.

Photo credit: Getty Images

WISEST Summer Research Program Equips High School Students With Skills for Life

For high school students, summer break is often a time to kick back and put thoughts of studying in the rearview mirror. However, Emma Doney, a Grade 11 student from Sturgeon County, saw the summer of 2023 as an opportunity to gain hands-on research experience, learn about university life and explore a future in STEM (Science, Technology, Engineering and Math) all while connecting with like-minded peers and knowledgeable mentors.

Doney participated in the Women in Scholarship, Engineering, Science and Technology (WISEST) summer research program and, over six weeks, studied the effect of increased atmospheric ozone concentration on pheromone communication between mountain pine beetles. Doney worked with a graduate student in a lab in the Department of Renewable Resources to find out if higher ozone levels break down bark beetle pheromones, which are important for mating and preventing reproduction and host tree colonization.

Unlike a high school science experiment, Doney says she didn't already know the answer.

"I liked that it was an actual experiment trying to discover something and that it had a real-life application to the environment," says Doney.

Doney also participated in various professional development and hands-on learning opportunities, from touring other research labs to discussing the challenge of improving diversity, equity and inclusion. She also got her first taste of living away from home by taking advantage of the on-campus housing available for rural WISEST students.

"WISEST is a program that gives you experiences you will use for the rest of your life," says Doney. "I didn't want it to end!"

MORE INFORMATION

Visit the **WISEST** website to learn more about the summer research program and the 2024 application period.

Emma Doney
Photo Credit: Emma Doney

The Hidden Partner of Trees

Forest ecologist Justine Karst is on a quest to gain insights into little-known fungi hidden underground. By delving beneath the forest floor, Karst, associate professor in the Department of Renewable Resources, aims to unearth more effective forest management and conservation strategies.

Mycorrhizal fungi form a beneficial relationship with the roots of trees in Canada's boreal forest. The fungi help the trees access water and nutrients from the soil, while the trees provide the fungi with sugars produced through photosynthesis. Mycorrhizal fungi comprise a sizable portion of forest soil biomass: Just one cubic centimetre of forest soil can contain up to a kilometre of tiny fungal branches called "hyphae." However, because these fungi are underground, their role in maintaining forest and soil health is often overlooked.

"At my lab, we're interested in better understanding the function and role of mycorrhizal fungi, particularly in terms of soil processes and what they are doing in the forest," says Karst. "We want to know what they are doing as 'partners' of trees."

Understanding the role mycorrhizal fungi play in storing carbon and how this is potentially impacted by disturbance is another area of interest to Karst. Recent research by graduate student Nicole Lau explored whether mycorrhizal communities are impacted by tree mortality caused by the mountain pine beetle and, if they are, what it means for carbon stocks in soils.

Karst notes that there is a lot of interest in understanding what happens to beetle-killed stands. "Twenty years ago, these stands were projected to be huge carbon sources, so now we are looking at them and asking, are they carbon sources? Or are they storing more carbon than we estimated 20 years ago?"

Looking to the future, Karst is interested in mapping mycorrhizal networks to advance understanding of how different species of fungi and trees might be connected and structured. She also wants to explore how and where ectomycorrhizal fungi, which connect to the roots of woody plants and take up water for trees. Ultimately, Karst aims to provide forest managers with evidence-based information that helps better inform decisions related to forest health, such as when to thin stands or remove dead trees.

Photo credit: K. Kovach

Tree Diversity Experiment First for North American Boreal Zone

A groundbreaking tree diversity experiment is set to launch in northern Alberta. The study — one of the largest of its type in North America and the first in the continent's boreal zone — aims to determine which combination of tree species is most likely to thrive, particularly in the face of climate change.

The ambitious experiment comes at a time when forests are in the spotlight. In addition to their long-appreciated economic benefits, forests are gaining considerable attention for capturing carbon, supporting animal habitats and enhancing human and community well-being.

As a result, there's a push to plant more trees. In 2021, for example, the Government of Canada committed to planting two billion trees within a decade. That's in addition to the approximately 600 million trees planted in Canada annually, with about 50 million of those in Alberta.

With this in mind, Charles Nock, assistant professor in the Department of Renewable Resources, asks an essential question: if we can choose which tree species to plant, which combination is best for the trees' survival and the overall ecosystem?

To shed light on this question, 50,000 tree seedlings will be planted on nine hectares of department-owned land near Peace River.

"Picture the land like a checkerboard," says Nock. "In some checkerboard squares, a single tree species will be planted, while in other squares, a mix of tree species will be planted." More than 20 combinations of trembling aspen, larch, paper birch, white spruce and lodgepole pine will be evaluated to determine which grouping grows best.

The experiment's northern location is significant, says Nock. The boreal forest is crucial for its carbon sequestration capacity and other ecosystem benefits. Yet, according to TreeDivNet, a tree diversity study in Finland is the only experiment occurring in the boreal.

"The Alberta boreal is like the canary in the coal mine," says Nock. "With Western Canada predicted to get warmer and drier, we are particularly interested in how the trees in our experiment respond to drought."

"The Alberta boreal is like the canary in the coal mine."

Charles Nock

One potential climate mitigation strategy is planting trees in the boreal that typically grow further south. The Peace River study will examine whether interactions between different tree species help seedlings from warmer areas survive by, for example, protecting them from frost.

New tools are being developed to obtain data beyond tree size, such as microclimates created by the multispecies groupings and the trees' response to draught below ground. An "air sniffing drone" will measure volatile organic compounds, a broad range of gasses emitted by trees. The gasses serve many purposes, such as protecting trees against herbivores and increasing tolerance to environmental stresses.

Project Forest, a non-profit that partners with businesses and communities to plant forests, is supplying the tree seedlings. It's the first time the organization, founded by University of Alberta forestry graduate Mike Toffan, '06 BSc(ForestBus), has partnered with an educational institution. Nock says he and his colleagues Nadir Erbilgin, professor and department chair, and Brad Pinno, associate professor, can "dream big" because of Project Forest's participation.

In addition to Project Forest, the Peace River study is supported by the Natural Sciences and Engineering Research Council of Canada, the Canadian Foundation for Innovation, and industry.

The experiment is expected to launch in the spring, with trees planted by the end of June.

Faculty & Staff Directory

Our faculty members focus on one or more of the following research areas: Agriculture and the Environment, Conservation Biology, Forest Ecology and Management, Environmental Soil Science, Reclamation and Restoration of Land and Water.

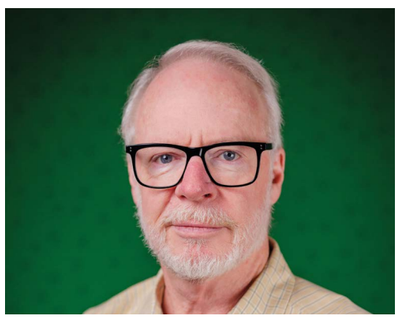
NOT PICTURED

GLEN ARMSTRONG
Associate Professor
Forest Management & Policy

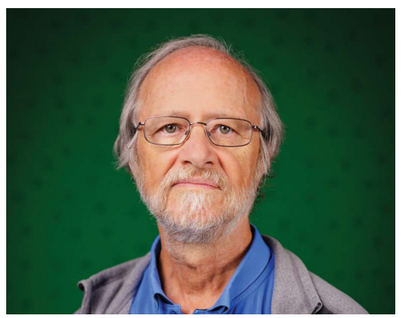
MARK POESCH
Associate Professor
Conservation Biology

SILVIE A. QUIDEAU
Professor
Soil Biogeochemistry

FIONA SCHMIEGELOW
Professor
Wildlife & Landscape Ecology and
Director (Northern ENCS Program)



JOHN ACORN
Faculty Service Officer
Conservation Biology



RENÉ BELLAND
Faculty Service Officer
Conservation Biology

JEN BEVERLY
Associate Professor
Wildland Fire

SCOTT CHANG
Professor
Forest Soils & Nutrient Dynamics

MILES DYCK
Professor
Sustainable Agriculture

NADIR ERBILGIN
Professor
Forest Health & Chemical Ecology
and Department Chair

ROBERT FROESE
Professor & Endowed Chair
Forest Growth & Yield

CAROL FROST
Assistant Professor
Arthropod Community Ecology
& Conservation

ANDREAS HAMANN
Professor
Climate Change Adaptation and Director
Academics & Communications

FANGLIANG HE
Professor
Biodiversity & Landscape Modeling
and Tier 1 Canada Research Chair

GUILLERMO HERNANDEZ-RAMIREZ
Professor
Sustainable Agriculture & Environmental
Soil Science and Director-Graduate Studies

JUSTINE KARST
Associate Professor
Mycorrhizal Ecology

SIMON M. LANDHÄUSSER
Professor
Ecophysiology & Applied Forest Ecology

M. DEREK MACKENZIE
Associate Professor
Ecosystem Ecology

M. ANNE NAETH
Professor
Land Reclamation & Restoration Ecology

SCOTT NIELSEN
Professor
Conservation Biology

CHARLES A. NOCK
Assistant Professor and NSERC
Industrial Research Chair
Forest Ecology & Management

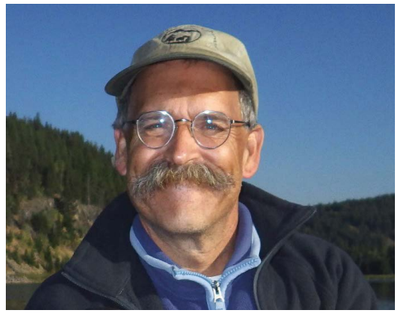
DAVID OLEFELDT
Associate Professor
Catchment and Wetland Sciences

RICK PELLETIER
Faculty Service Officer
Spatial Information Systems, GIS

BRAD PINNO
Associate Professor
Forest Management and Silviculture

WILLIAM SHOTYK
Professor
Geochemistry and Bocock Chair in Agriculture & the Environment

TARIQ SIDDIQUE
Professor
Soil Chemistry & Environmental Microbiology



ULDIS SILINS
Professor
Forest Hydrology

BARB R. THOMAS
Professor
Applied Tree Improvement & Ecophysiology, Forest/NSERC Industrial Research Chair and ALES Associate Dean (Research)

JANUSZ ZWIAZEK
Professor
Tree Physiology

Administration Staff

SARAH GOODING
Academic Department Manager

CHRISTIE NOHOS
Executive Assistant/Office Manager

ALICE SECH
Executive Assistant

Acknowledgements

Thank you to Kristy Burke and Matthew Pyper at Fuse Consulting Ltd. and Mary Lou Reeleder for collecting and writing the content in this report.

Leading with Purpose.

UNIVERSITY OF ALBERTA

Department of Renewable Resources

751 General Services Building
University of Alberta
Edmonton, Alberta T6G 2H1

Faculty of Agricultural, Life & Environmental Sciences

uab.ca/ales

@ualberta_ales **@UofAALES** **@UofA_ALES**