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Renew

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UNIVERSITY OF ALBERTA
DEPARTMENT OF
RENEWABLE RESOURCES

Providing **Solutions**

A Message from the Dean

The facts are undeniable. Air and water temperatures, sea levels and humidity are all rising while snow cover, sea ice and glaciers are all diminishing. Concerns about the environment and climate change are mounting.

In Alberta, there is particular concern about the environmental impact of natural resource development, specifically within the energy, forestry and agriculture sectors.

How we manage natural and managed landscapes is critical to ensuring a healthy, sustainable environment in our province.

The faculty's Department of Renewable Resources is focused on providing solutions in this area through its impressive research, teaching and service programs in conservation biology, forest ecology and management, agriculture and the environment, reclamation and restoration of land and water, and environmental soil science.

Indeed, we are proud of their ability to deliver practical scientific and management applications in natural and managed landscapes. For example, the provincial government's Climate Change Panel is developing recommendations for greenhouse gas mitigation with input from the Department of Renewable Resources. We're equally proud of their excellent track record in training the next generation of landscape managers.

Stan Blade, Dean
Faculty of Agricultural, Life and Environmental Sciences

Sewage, **variation** in ground surface, could be key to **arctic reclamation** success

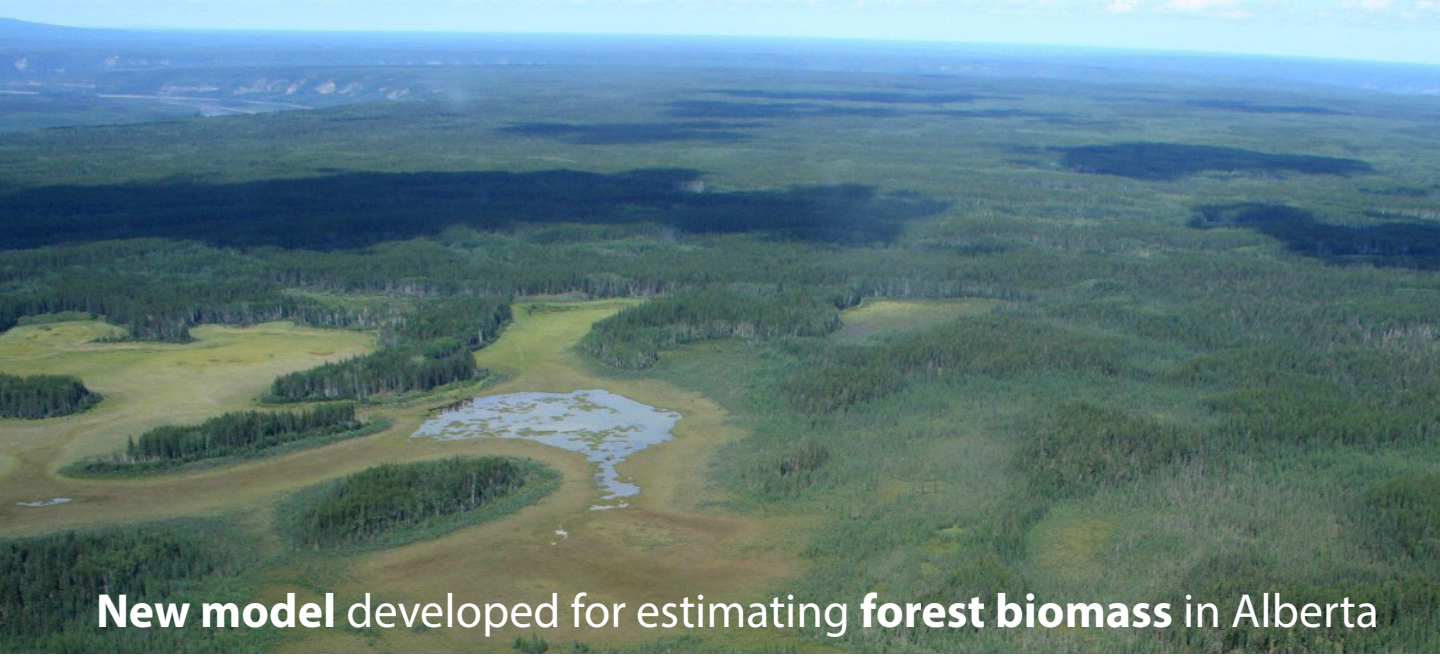
Growing plants in the arctic can be a tough business, but research from the lab of M. Anne Naeth is showing that a little bit of creativity can go a long way. Early findings suggest that mixing sewage into reclamation materials, and creating variation in the reclamation surface, could substantially increase plant growth.

Their work is taking place at the Diavik Diamond Mine, 320 km north-east of Yellowknife, where managers are challenged by a short growing season and harsh arctic conditions. To tackle the challenge, Valerie Miller, a PhD student with Naeth, collected reclamation materials then headed back to the lab to see how adding various amendments affected plant growth. Biochar, Black Earth, peat, soil, sewage sludge and fertilizer were added and the impacts on plant growth monitored. The best performers, sewage sludge and soil, were then taken into the field and tested at the mine.

Early observations suggest that adding sewage sludge to the reclaimed sites helps plants grow faster and cover more area than previous reclamation attempts. The team also discovered that by creating small depressions and furrows in the ground, water started pooling on the site, providing a critical resource for thirsty arctic plants.

The next steps for the team include introducing shrubs, lichen and mosses to begin the process of establishing more natural communities on the site.

The project was supported through a long-term partnership with Naeth and Diavik Diamond Mines Inc. and through the Land Reclamation International Graduate School funded by the NSERC CREATE program.



New model developed for estimating **forest biomass** in Alberta

A new model developed for estimating forest biomass could have big implications for mapping the amount of carbon in the boreal forest – information that is critical for understanding how the boreal forest contributes to the global carbon cycle.

While carbon in the boreal has been a hot topic, the model makes two important strides forward in improving the accuracy of biomass modelling. First, it includes samples from the diversity of landforms found in the boreal – including peatlands, harvested sites and mature forests – while other techniques have tended to focus only on productive forests. Second, the model estimates the height of forests from LiDAR imagery which greatly improves carbon predictions compared to past models.

The new model was developed by Fangliang He and his colleagues, and they see immense opportunity for applying the findings, as discussions about carbon sequestration in the boreal forest continue to heat up.

The study was supported by the Alberta Government, Weyerhaeuser, West Fraser, Alberta Innovates Bio Solutions, Alberta Biodiversity Monitoring Institute and NSERC.

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Creative approach to **forest harvesting** yielding big returns

New research from the lab of Phil Comeau is confirming the value of understory protection harvesting – showing that it can increase the growth rates of spruce trees by as much as 80%.

Understory protection represents a simple, but creative approach to forest harvesting. In the boreal forest, a common sight is aspen trees towering over smaller spruce trees. In the past, harvesting would have targeted the aspen trees with little regard for the spruce, or targeted the spruce by waiting for the aspen to die out and the spruce to mature. Understory protection focuses on removing the aspen, while protecting the immature spruce trees for future harvesting opportunity.

Comeau found that immediately after removing the overstory aspen, the understory spruce trees began to accelerate their growth rates. After 4-5 years the growth of spruce trees increased by 80% compared to forests that did not have the overstory aspen removed.

Taking these findings one step further, the team is using the new information to refine the Mixedwood Growth Model (MGM) which predicts the future volume of wood within a forest stand. Previously, the team found their model was underestimating how quickly small spruce trees were growing after understory protection harvesting.

The project is funded by the Forest Resource Improvement Association of Alberta (FRIAA), with support from the Western Boreal Growth and Yield Association, the Mixedwood Management Association of Alberta, and several other Alberta forest companies.

Breton Plots a **finalist** for prestigious **ASTech Award**

The long-term Breton Agricultural Research Plots have been nominated as a finalist for the Alberta Science and Technology (ASTech) award in Innovation in Agricultural Sciences, sponsored by Dow Agro Sciences. The research plots have a long history, including numerous breakthroughs that are helping farmers meet their productivity needs while also enhancing the environmental sustainability of the agriculture industry.

"This is our passion and it's nice to be recognized for our hard work" said Miles Dyck, a lead researcher at the Breton Plots and member of the management team.

The ASTech awards will be presented on November 6, 2015.

Impressive **new** analytical **lab 'open for business'**

The capacity to analyze soil, plant and water samples within the Department of Renewable Resources has been transformed with the relocation and expansion of the Natural Resources Analytical Laboratory (NRAL). The lab is becoming the 'go to place' for chemical analyses, with its increased capacity to serve a wide array of researchers, students and external clients.

"What makes NRAL unique is that we are able to work with researchers to fully understand their analytical needs, engage in high-level dialogue, and provide more than just 'black box' analysis outputs. This makes us much more research focused than standard commercial labs" said Brett Feland, the newly hired Senior Lab Coordinator.

The list of services offered by NRAL is significant and encompasses both common and unique approaches for analyzing environmental samples. This includes total elemental and speciation analyses of key nutrients and most metals.

For more information on the services offered please visit: http://tinyurl.com/RenRLab

Preparing **students** to provide **solutions**

Student Profile: Sonya Odsen

For Sonya Odsen, completing a graduate degree in the Department of Renewable Resources helped her to hone her independence and apply her curiosity to solve new problems. Now with a Master's degree in hand she plans to take her experience and drive into the workplace.

Odsen worked with John Spence, John Acorn and Fiona Schmiegelow to understand how songbirds respond to forest harvest in the context of the EMEND Project in NW Alberta. More specifically, she wanted to see if retention harvesting – leaving a percentage of trees behind at harvest – was better for bird conservation than the traditional approach of clear-cutting. She used data collected over the last 15 years to uncover how impacts on songbirds changed over time as the forest regenerated.

Although songbirds were heavily affected by harvesting in the short-term, those effects became less severe over time.

"What we observed is a certain level of recovery of bird assemblages and old forest species back into these harvested sites," said Odsen.

She also found that, in comparison to traditional clear-cutting, the effects on the bird assemblage were reduced when as little as 20% of the trees were left behind during harvest. This was even the case for some species that depend on mature forest for their success. These results are helping resource managers evaluate the economic and environmental trade-offs of their harvest operations.

Odsen's program provides an excellent example of how our research-based degrees educate the next generation of resource managers. In this way, we are *preparing students to provide solutions*.

Odsen's project was supported by NSERC, Daishowa-Marubeni International, Canfor and the Government of Alberta.

Future uncertain for forests killed by mountain pine beetles

A new research project is teasing apart what happens to Alberta's pine forests after being attacked by the mountain pine beetle. The news so far isn't very good.

"What we found walking into these forests that were killed by the mountain pine beetle was that almost no new trees were growing in the understory" said Ellen Macdonald, a lead researcher on the project.

Lodgepole pine has adapted to regenerating after fire and relies on heat to release seed from its cones and exposed soil for its seeds to germinate. The absence of these two conditions in mountain pine beetle killed stands means that the forests are being taken over by shrubs, grasses and other plants instead of a new crop of pine trees.

"The long-term impacts of no regeneration in these stands could have important implications for values like timber supply and wildlife habitat," said Keith McClain, Mountain Pine Beetle Program Lead for fRI Research.

But the team isn't giving up yet. They are looking at various forms of site preparation, planting and seeding. The goal is to see if exposing soil, creating microsites and artificially regenerating the sites will provide the basis for the next generation of lodgepole pine forests. Results from these trials are expected in the next two years.

The project is funded by FRIAA, fRI Research, Alberta Innovates Bio-Solutions, and the Government of Alberta.

Acidity issues could surface during management of **oil sands tailings**

Innovation has been the name of the game when it comes to oil sands tailings, with new techniques regularly becoming operational. However, some tailings may become highly acidic during the drying process. New research from Tariq Siddique has shown that the potential acidity of tailings can be predicted by knowing the area where the oil sands were originally mined and the extraction process that produces the tailings.

The acidity present in the tailings is the result of a process called acid rock drainage. As the tailings dry, minerals inside the tailings are exposed to air and rain and can become highly acidic. The concern is that this acidity could pose challenges if tailings are applied during reclamation of the mine site by affecting plant growth over time.

But Siddique found that some tailings took longer to become acidic, than others. He found that it comes down to how much pyrite is in the original oil sands. A higher concentration of pyrite in the original material leads to quicker production of acidity in the tailings.

With this knowledge in hand, Siddique suggests that companies could manage acidity issues by adjusting how they process tailings based on where the source material comes from.

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New Director for Course-Based Master's Program a **role model** for students

Jen Beverly was an established scientist with the Canadian Forest Service when she did something unexpected. She quit her job and leapt into the private sector because she saw an opportunity to challenge herself. It was a big risk, but her commitment to life-long learning made her do it. Now, she has never looked back.

"I wanted to challenge myself to better understand the on the ground realities that companies face. It allowed me to really grow my career" said Beverly.

Beverly was recently hired to lead the course-based Master's program for the Department of Renewable Resources. Her goal is to use her passion for life-long learning to inspire working professionals to continue their own education and advance their careers. One of her key areas of focus is removing barriers for future students.

"For a large number of professionals in the resource sector, moving to an urban centre like Edmonton or Vancouver just isn't an option for continuing their education. So we are working to take our programs directly to these students through online programming" said Beverly.

Degrees are being developed in Forest Management and Ecological Restoration and Reclamation. The online model represents one of the first opportunities in Canada for students to complete a course based Master's degree online for these disciplines.

A critical first step for Beverly is hearing from potential students and employers. She wants to know what people are looking for in a course-based masters program; what their past experiences have been; and what employers see as needs for their staff from such a program. Have your say by contacting Jen at: jbeverly@ualberta.ca

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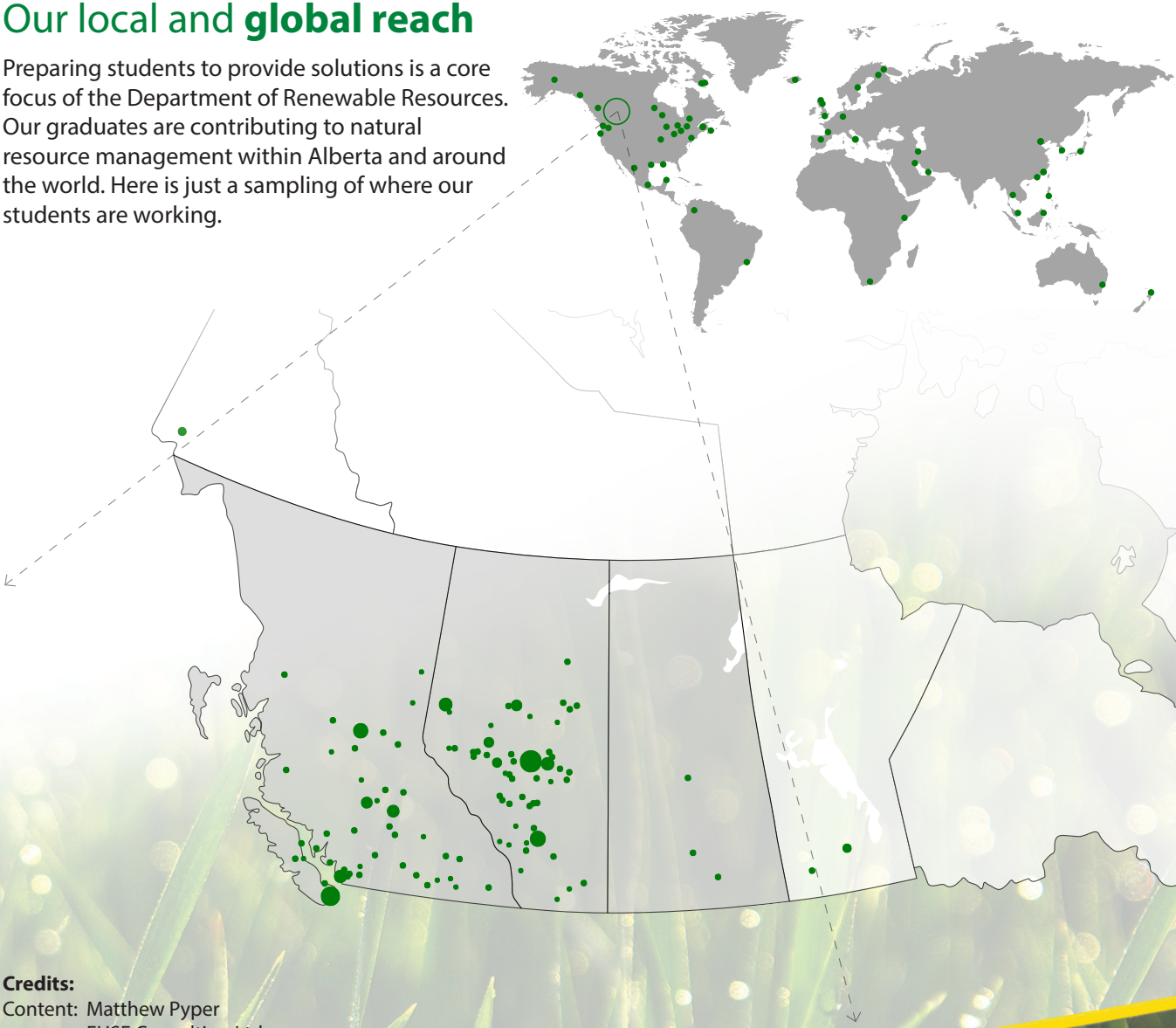
Our local and **global reach**

Preparing students to provide solutions is a core focus of the Department of Renewable Resources. Our graduates are contributing to natural resource management within Alberta and around the world. Here is just a sampling of where our students are working.



Credits:

Content: Matthew Pyper
FUSE Consulting Ltd.

Photos: Diavik Diamond Mines Inc. (p.2)
Daishowa Marubeni International (p.3)

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Department of Renewable Resources
University of Alberta
751 General Services Building
Edmonton, AB T6G 2H1
CANADA

Phone: 780-492-4413

Fax: 780-492-4323

www.rr.ualberta.ca

UNIVERSITY OF ALBERTA
FACULTY OF AGRICULTURAL,
LIFE & ENVIRONMENTAL SCIENCES

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