

## NRRI Mission:

Deliver research solutions to balance our economy, resources and environment for resilient communities.

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## From the Editor:

It would be nice to have crystal ball, wouldn't it? Perhaps a community conversation about the future is the next best thing.

NRRI and UMD are hosting a conference to dissect and discuss Minnesota's next steps for dealing with climate change.

"Our Climate Futures: Meeting the Challenge in Duluth" will be held March 19 & 20 with a keynote address the evening of the 20th by Dr. Jesse Keenan, faculty at the Graduate School of Design at Harvard.

"In an age of climate migration, we tend to focus on displacement and not necessarily the economic mobility associated with changing consumer preferences," Keenan says. "In one iteration of a climate future, Duluth may be well positioned to accommodate a diverse influx of people, culture and capital associated with a national redistribution of people and places."

*June Breneman*

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## NRRI develops online tool to make development decisions easier

Pump your own gas. Check yourself out at the store. Now, access your own data – hundreds of layers of data – to plan projects and make development decisions.

What once required digging and searching through many different databases and records, the assistance of a technology whiz and many hours of compilation can now be accomplished with a few clicks. A new online tool developed at the Natural Resources Research Institute will help communities, industries and non-governmental or nonprofit agencies in northeast Minnesota gain the big-picture view needed to plan development projects, help manage natural resources, or just understand what's there.

The Minnesota Natural Resources Atlas is a combination of mapping tools and data, packaged together in this easy to view and access format. It's available free at [mnnaturalresourceatlas.org](http://mnnaturalresourceatlas.org) and covers northeast Minnesota, though plans are in place to expand it across the state.

"It's really going to be useful to small organizations with limited GIS capabilities, or really anybody, to get the information they need to make more informed decisions," explained Senior Research Scientist Will Bartsch who has been developing this system over the past two years.

A few clicks can access a data catalog of over 250 multi-disciplinary spatial datasets that help the user understand, view and share that data. Collaboration to develop the tool spanned interdisciplinary units of University of Minnesota and consultations with federal, state and tribal agencies.



Senior Researcher Will Bartsch takes a break from working on the Natural Resources Atlas.

Someone in the agricultural industry might want to know the locations of feedlots and crop coverage. A wildlife researcher might want to know more about an area's flora and fauna, trout lakes and natural boundaries. Easily access historical precipitation records. Discover mineral resources, bedrock geology or aggregate locations.

Open the Water tab in the Data Catalog to view public fishing sites, water table depth, wetlands and wild rice lakes. Click on the Society & Economy tab to gather population data, cost of living and social vulnerability index.

"Our goal is to make information accessible, mostly to people who need

it to make good decisions, but also the general public," said Bartsch. "Our beta test participants told us it's very easy to use."

This northeast Minnesota demonstration project was funded with a portion of \$2.6 million from the state legislature that NRRI received for a Mining and Water Innovation Initiative. Additional funding from the Department of Iron Range Resources, matched by NRRI, is currently maintaining the datasets. Additional legislative funding is being sought to extend the coverage across the state and keep the atlas updated, vetted and accurate into the future.

## Prototyping engine part helps engineer clean snow machine

Last year, they came in second place. This year, they are working hard to do even better.

A team of 16 UMD undergraduate students are competing again in the International Clean Snowmobile Challenge in Houghton, Michigan, March 4 – 9. Their goal is to modify a snowmobile that performs well while reducing emissions and noise.

"We took what we learned last year about the competition and really upped our game," said team member Josh Dronen. "We feel really good."

The students organized themselves into small groups take on different parts of the sled to modify. Dronen, a senior in the Swenson College of Science and Engineering, is leading a group that is modifying the engine's intake system. But what he wanted to do didn't seem possible, until he learned that NRRI had the prototyping capabilities he needed – selective laser sintering with carbon fiber nylon composite material.

"It's the strongest material we have to build parts with here," said Kory Jenkins, NRRI Prototype Lab manager. "I'm glad we were able to meet the geometry and strength requirements for his application."

The carbon fiber nylon composite is a material that's generally used in aerospace components. NRRI has used it in the past to build parts for the UMD Rocketry Team, local industry and entrepreneurs.

Using computer modeling and simulation, Dronen and his group knew the intake manifold would require a complex shape to supply enough air while staying within the size constraints of the snowmobile. Additive manufacturing makes it possible to create parts with very complex shapes in a short period of time.



A UMD Clean Machine team member takes the re-engineered snowmobile out for a test ride.

"We wanted to get uniform air flow to the engine so it can run as efficiently as possible," said Dronen. "Building this part at NRRI was key to our redesign."

The competition is organized by the Society of Automotive Engineers to create a snowmobile that would be acceptable for use in environmentally sensitive areas, like National Parks. In addition to making new friends on the team, Dronen appreciates the opportunity to take what he's learned in class and apply it to a real, hands-on situation. Last year's competition earned him an internship with BorgWarner, Inc. in Ithaca, New York working in fluid simulations.

"When I graduate, I'd love to continue working in fluid simulations in the automotive industry," he added. "The competitions have been a very fulfilling experience."