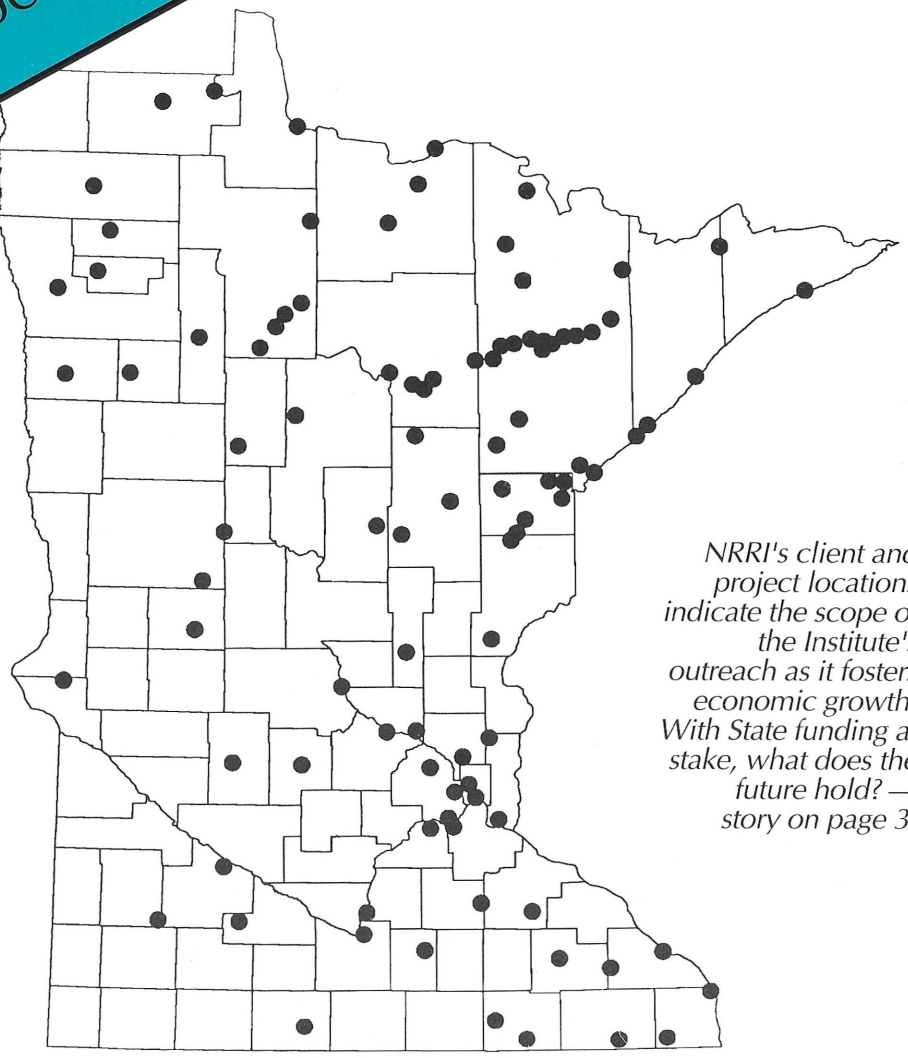
NRRI NOW

A publication of the Natural Resources Research Institute

Fall 1991

Special Progress Edition



NRRI's client and project locations indicate the scope of the Institute's outreach as it fosters economic growth. With State funding at stake, what does the future hold? — story on page 3.

State budget cuts threaten NRRI and its continued contributions to Minnesota

University of Minnesota Duluth

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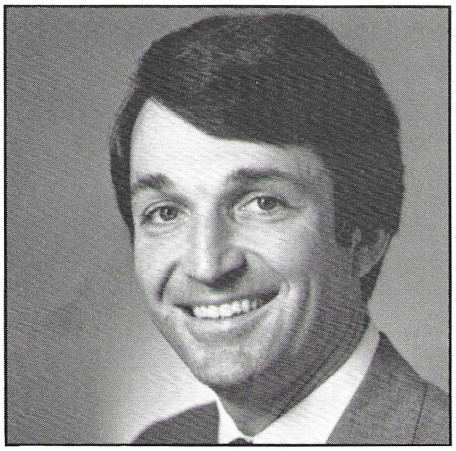
NRRI: A key element of the region's vision for the future



By Michael J. Lalich
Director

In the previous issue of *NRRI Now*, I focused my attention on NRRI's potential loss of State Special operating funds in July 1992 due to Governor Carlson's veto. Simply stated, NRRI may not be able to continue to operate if the issue of the veto is not addressed during the 1992 legislative session.

The Governor's veto was based on financial considerations rather than program analysis, and he has since expressed support for University research. In response, Institute activity has included showcasing accomplishments while maintaining diligent efforts on existing projects. This issue of *NRRI Now* reviews some of our accomplishments and ongoing project activity.

But what about the future? Should NRRI continue because of its relevance to the region and because there are markets for NRRI initiatives? From my perspective, the answer to this question is a resounding yes. Natural resources will continue to be a primary focus for Minnesotans in terms of economic development, recreation and environmental issues. Already opportunities to develop major new program initiatives are providing management challenges to the Institute.

These opportunities are not lost to others. The Ernst & Young consulting firm recently completed a major northeast Minnesota economic reassessment study for the Arrowhead Regional Development Commission. Among four major target areas, the firm recommended that the region concentrate its economic development efforts on value added wood products and environmental industries. Similarly, about 60 regional leaders are participating in an Economic Leadership Conference Series for northeastern Minnesota sponsored by the Blandin Foundation. Among their top priorities, they are considering promoting the area as a global freshwater/environmental center and encouraging efforts to develop the wood and mineral industries. Clearly, NRRI has leadership and cooperative roles to play in implementing these visions.

The concept is just beginning to emerge of northeastern Minnesota as an area with a unique combination of knowledge and technology that can be focused on research and business spin-offs based on environmental issues and markets for environmental analyses and environmental remediation. Efforts to secure the future of the taconite industry continue to be extremely important and NRRI is playing a major role. The Institute is working with the industry through an American Iron and Steel Institute contract to learn how to process taconite for the direct steelmaking process envisioned as a replacement for current blast furnace technology.

NRRI has already helped the high value-added secondary wood

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Building small business

The assistance provided by the NRRI Business Group helps strengthen northern Minnesota's economic base

Cabinetmaker and shop foreman at Excel Door & Millwork, Brian Raisanen works on a custom-designed information booth.

Excel Door & Millwork expands

Scott Chida, owner of Excel Door & Millwork in Duluth, was referred to the Center for Economic Development about two years ago when he confronted his operation's financial challenges. Since then, he has taken his business from $35,000 in losses to $85,000 net income. With soon-to-be expanded space and production lines, Chida plans to hire four additional employees.

"Our overhead was too high," said Chida. "I knew nothing about cash flow projections or how to really utilize financial statements. I needed to take a good look at my overhead and decide whether it was better to cut back to increase profit or expand."

NRRI Business Group financial specialist Jim Skurla provided assistance which helped Chida pinpoint areas of his operation that could be changed to help cut losses. Work orders and job tickets were established and his computer accounting system was set up to track profits.

"We discovered that our manufacturing interests were too broad," said Chida. "We needed to concentrate on producing commodity and high end custom production. All during 1990, Jim worked with us here every month to help set up our computer accounting system and train us to use it. Now we do our own financials."

In addition to guiding Chida through the ins and outs of financial statements, the availability of business

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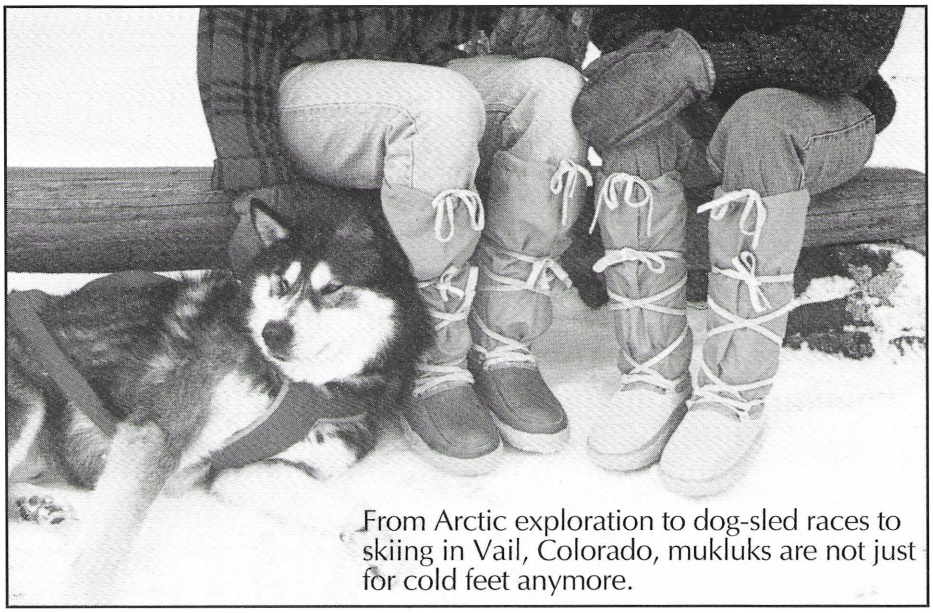
assistance provided motivation. "Jim Skurla came in and provided fuel for the fire, and I knew I really had to dig in to make my business work," he said.

How are things going now? "Excellent," said Chida. "Our new equipment is being financed by Minnesota Power and we're putting together plans for a 5,000 square foot expansion." The additional space will enable Excel to fully utilize existing machinery to produce molding for in-house and customer requests. Excel fills commercial orders for architectural millwork from all over the U.S. and currently employs seven.

UMD's business assistance services enabled Chida to do the work necessary to transform his business. "It helped me get into the 'survival mode.' You've got to survive before you can think about success and expansion. Our profits have increased while sales remain steady. Although we're feeling the recession, our work load is steady and fast," he said.

For Chida, hard work has visibly paid off -- losses turned to profits, expansion, extended services, new employees -- and new business savvy to top it off. "It's made a tremendous difference. Now I can see problems developing before they become big problems."



From Arctic exploration to dog-sled races to skiing in Vail, Colorado, mukluks are not just for cold feet anymore.

Steger Designs moves into new markets

"Business is great!" says Patti Steger of Steger Designs. "It's so good that we needed to expand, but I'm a designer, not a financial expert."

Because Steger consulted the NRRI Business Group for loan application assistance when she started her business in 1987, it was easy to decide where to turn for guidance in expanding Steger Designs. She called Kathy Forslund of the NRRI Business Group, an expert in providing financial consultation to small companies. "Kathy was excellent to work with--she doesn't miss a thing," said Steger. "I was amazed at how quickly she could pull the figures together to help us with our loan application."

Forslund coordinated financial data from the company's records for the loan application. "Steger's expertise is in designing mukluks. The Business Group's expertise is in helping companies make the proper financial projections so they can continue to grow and expand their markets," said Forslund.

Steger Designs qualified for an expansion loan and now has a 16-member crew working year round in Ely. The company has moved into the wholesale and international

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markets, with stores in ski resort areas such as Vail, Aspen and Jackson Hole now carrying Steger mukluks for their customers. "We're just keeping up with our orders," said Steger, "and our basic advertising has just been word-of-mouth." Such advertising has resulted in Steger mukluks appearing on models in *Elle* magazine.

As the loan was approved, expansion plans focused on how to maximize the space available. Creative solutions such as renovating the garage into a warehouse were the result of staff brainstorming. And with space at a premium, employees sew at home, making Steger Designs truly a cottage industry of the 90s.

Home Grown Pine goes retail

"Business is so good, we're actually a little too busy if that's possible," said Ed Gutsch of Home Grown Pine Company in Eveleth. Home Grown Pine grew into a full time occupation for Gutsch this year after starting out of necessity three years ago.

When Gutsch and his wife Sandy moved from Alaska to Minnesota in 1988, they didn't have any furniture--so Gutsch made some from home-grown pine using colonial and country styles. Friends and neighbors liked the styles so much that they started requesting furniture for themselves.

As business began to grow, Gutsch wanted to make furniture full time but financial institutions needed a business plan first. "I had no concept of what is involved in making a business plan," said Gutsch. "I needed the help that the NRRI Business Group provides."

With the assistance of NRRI's Jim Skurla, Gutsch put together the financial projections and business plan that allowed him to get the loan to make his furniture

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Sandy Gutsch, co-owner of Home Grown Pine in Eveleth, displays handcrafts and specially made furniture in her retail shop.

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business a full-time reality. The company added a gift store which helps Gutsch keep an eye on the retail market.

"I've been real happy with the help that I've received from NRRI. With more time, I could benefit even more from additional training that NRRI offers," said Gutsch.

Doing financial projections is part of Jim Skurla's expertise. "Like most people with a new business, Ed Gutsch didn't know much about the financial end. He's a craftsman who wanted to put his craft to work. We provided the information on how to write a business plan, but Gutsch is the one who wrote it," said Skurla. "Then we put the final touches on the plan and provided the financial projections for the loan application."

Four people are employed full time at Home Grown Pine with two more onboard for the holiday season. By joining forces with enterprising Minnesotans, NRRI helps dreams become reality.

Business development specialist Kathy Forslund visits Mike Biron's sawmill in Lakewood Township.

Logger plans a sawmill

Mike Biron, Lakewood Township logger, operates a small sawmill once a week. He wants to make the transition to full-time sawmill owner and has a good idea of what he hopes the new Lester River Sawmill will be like. He knows logging, but needs guidance with the information-gathering and decision-making processes required to begin his new venture.

Last June, Biron was referred by his banker to UMD's Center for Economic Development, "home base" of the NRRI Business Group. Since then, Biron and business development specialist Kathy Forslund have been working on a plan that will enable him to secure financing for land, a new building and machinery. Three years from now, he wants to sell planed, dried lumber in addition to providing the green, rough-cut lumber he already makes.

"Since Mike will be making a gradual transition that involves business expansion and new markets, the services we provide will be for the long-term," said Forslund. "It's a comprehensive project."

First Biron and Forslund met with Hugh Reynolds and Pat Donahue from NRRI's BioProducts Division, who introduced Biron to sawmill owners willing to share information about equipment and products. As part of the

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Technology transfer, new processes and more valuable products:

NRRI assists manufacturers and industries, large and small

Coleraine scientist Blair Benner tests column flotation.

CMRL expands research

Technical expertise garnered from making the Minnesota taconite industry more competitive has Coleraine Minerals Research Laboratory (CMRL) expanding into environmental remediation. Scientists there are applying proven engineering methods to such problems as the clean-up of contaminated Great Lakes harbor sediments.

Helping the domestic taconite industry remain competitive

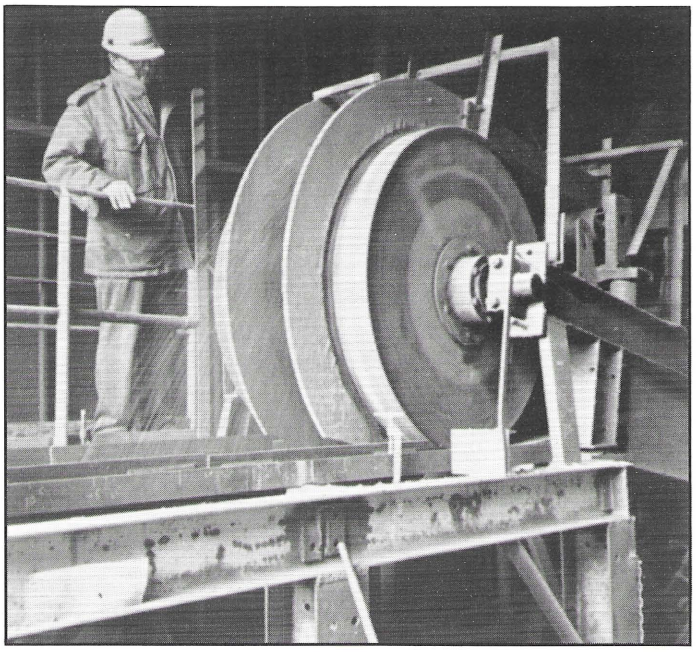
Research on taconite related projects remains CMRL's primary objective. This research is basically threefold: reduction of costs, improvement of quality and increased productivity at established plants.

Projects such as converting primary rod mills to ball mills indicates possible savings to the taconite industry of $.20 to $.40 per ton. This means that companies producing about 25,000,000 tons per year could save $5 to $10 million. A related project, magnetic cobbing of primary mill feed, will enable plants which convert rod mills to ball mills to gain additional production benefits. Studies aimed at producing higher grade concentrates at 3.0 percent silica have focused on column flotation, a new development on the Iron Range that promises to reduce costs and improve plant efficiency. Longer term studies directed toward developing a flowsheet to make 2.0 percent silica concentrates for direct steelmaking technology have combined both new and old methods: fine

screening, matrix magnetic separation, vertimill grinding and both conventional and column flotation. This new process flowsheet will be carried through the pilot plant stage this year.

Since its initial research for Cyprus Minerals, which helped the company decide to reopen operations in Silver Bay and employ about 400, CMRL has continued a research program for the company to improve product quality and production efficiency.

In mining, CMRL is working with USBM, Minnesota Technology Inc., USX and Iron Range Coop Committee to apply electronic imaging for on-stream size analyses of taconite ore to evaluate fragmentation and improve blasting practice. CMRL continues work on the substitution of lime and dolomite hydrate based on Minnesota's limestone and dolomite deposits for fluxed pellet production.



Don Fisher checks magnetic cobbing for additional production benefits.

Although it has been nearly 50 years since the first commercial pellets were produced at Silver Bay in 1955, there are several innovative process improvements under development. "Continued research in support of the North American taconite industry is needed to maintain our iron ore raw material base and meet overseas competition. If we do not maintain a serious iron ore position in North America, the long term impact will be domination of the market by foreign ore sources which will eventually have a severe impact on the U. S. economy," said CMRL director Rod Bleifuss.

Environmental clean-up technology

Engineering techniques used to create these and other processes are leading to a two-year $1,000,000 EPA grant to CMRL for applying mining technology to process contaminated bottom sediments by concentrating the hazardous components and returning "clean" material to the environment.

The EPA grant will support research at CMRL on the application of techniques developed and applied over many years for the concentration of both industrial minerals and metallic ores to cleaning up harbor sediments. "This is not a 'magic bullet' but the application of tested engineering and mineral processing principles to the treatment of a very complex 'ore,' " said Bleifuss.

Other environmental remediation projects include cleaning lead and arsenic contaminated soils, light weight aggregate production from waste paper sludge, removal of lead from blasting sands and the containment of hazardous fly ash from mass-burn municipal incinerators.

Future of CMRL

"Our research efforts at CMRL in support of the taconite industry will remain strong throughout the next decade in order to support the domestic steel industry. Because of our expertise in mineral processing, we expect to become much more heavily involved in remediation studies on contaminated materials, particularly bottom sediments from the Great Lakes area," said Bleifuss.

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Timber: Supply, demand and research

Timber-r-r! The call echoes through Minnesota's history. If the BioProducts Division of NRRI has anything to do about it, the call will continue for generations to come.

Concern for cautious use of timber supplies is at the forefront of state issues. This year, Blandin Foundation provided the means to continue evaluation of increasing aspen production through mechanical strip-thinning by a $260,000 grant to NRRI. "Blandin Foundation, celebrating its 50th year, has maintained a long-range commitment to Minnesota," said Charles Driscoll of the Blandin Foundation. "This grant emphasizes our interest in forest resources because of the critical effect of forest productivity on employees situated in many of our rural communities."

"From the start this study included participation of forest industry workers, the end users of the information, which means the project has real world implications," said Berguson.

Previous to the Blandin Foundation grant, NRRI's John Gephart completed a timber study for the Minnesota legislature analyzing supply from a mill's perspective for future resources and availability on an economically realistic basis. The study used the 1977 forest industry data and indicated that Minnesota aspen currently has an age imbalance, which means that the cost of aspen is likely to rise in 10-20 years as competition increases for low-priced aspen.

The timber study prompted NRRI's Bill Berguson and Dan Buchman to check options for increasing the economical aspen supply in the relatively short term of 10-20 years. Uncovering research started in the late 70s, the two researchers looked at methods of strip-thinning aspen stands. "Recognizing the right time to apply research is critical," said Berguson.

At $60-80 an acre, thinning by hand is impractical. Mechanical strip-thinning, using equipment readily available to loggers, shows significant increases in productivity in most cases. More research is needed to determine if this method is a potentially cost-effective management tool for increasing forest productivity.

"With the Blandin Foundation grant, we'll be able to continue our research into mechanical strip-thinning," said Berguson. "It allows us to gather information to adequately understand the effects of thinning across a variety of sites."

Participating in the study by donating the 14 test sites and providing the equipment for mechanical strip-thinning are St. Louis, Cass, Clearwater, and Koochiching counties, the Minnesota Department of Natural Resources, Blandin Paper Company and Boise Cascade Corporation.

"From the start this study included participation of forest industry workers, the end users of the information, which means the project has real world implications," said Berguson.

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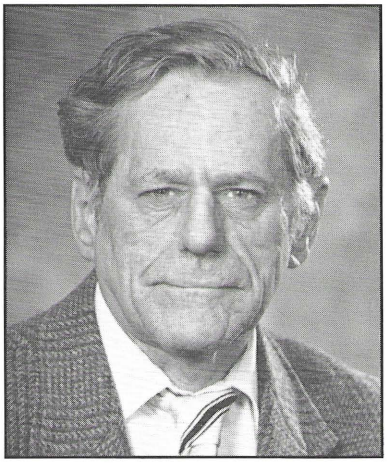

Hugh Reynolds

American Furniture Craftmen's Sean Bakken examines product design with NRRI's Steve Kossett (right). After starting with four employees, the company now employs 11.

Mechanical strip-thinning uses bulldozers and skidders (loggers' equipment) to thin stands of aspen from 6000 stems per acre to 2000 at a cost of $10-14 per acre. Because thinning is practiced during the winter, no soil disturbance occurs. This method speeds up the naturally occurring process, which takes up to 40 years.

"The next two to three years will indicate trends in mechanical thinning effectiveness with implementation of these methods possible in five years," said Buchman.

Continuing to examine the productivity of Minnesota's resources for future generations is a goal of NRRI's scientists.

Craftsmen at work in Minnesota

People working to create quality furniture in Meadowlands makes Larry Schneiderman very happy. "My intention in starting American Furniture Craftsmen was to improve the quality of popular casual dining furniture and create meaningful employment at the same time," said Schneiderman, a long-time retail furniture businessman.

The company was Schneiderman's brain child. NRRI's Hugh Reynolds provided technical assistance including product improvements and environmentally safe finishes. In July 1990 the first shipment of quality casual dining furniture was delivered to customers.

"With Reynolds' help, we were able to go into production more quickly than we would have otherwise," said Schneiderman.

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NRRI Environmental Studies help ensure sustainable growth...

...& work to solve Minnesota's biggest resource problems

Water resources

Water studies constitute a major program area at NRRI. After all, it's the most fundamental resource Minnesota has to offer. In addition to initiating Lake Superior research projects, NRRI has concentrated on other areas important to northern Minnesota resource and regulatory agencies: the Great Lakes, acid-sensitive lakes, mine pit lakes, environmental chemistry and the support offered by NRRI's Central Analytical Laboratory.

Great Lakes research

NRRI's Great Lakes research helps develop criteria for better evaluating water quality as well as methods of cleaning up contaminated sediments and waters. Institute scientists were recently awarded major funding in support of several projects which will positively affect both local and nationwide water quality improvement efforts. Major projects led by NRRI, many with support from the U.S. EPA Laboratory in Duluth and UMD/UWS professors include:

• a three-year study of the Great Lakes watershed. Carl Richards, Lucinda Johnson and George Host are developing biological indicators required for use by the nation's Clean Water Act. The project is funded by a $248,000 grant from the U.S. Environmental Protection Agency (EPA) and will result in standardized methods of water resource assessment for use by managers.

• a two-year, $210,000 project proposal to provide a better understanding of how

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pollutants affect Great Lakes ecosystems. The role of naturally occurring bacteria in degrading inputs of nutrients and toxins will be examined by Joseph Schubauer-Berigan.

• a study based on the fact that pollutants such as dioxins, PCBs and heavy metals from industrial and waste facilities become deposited in sediments and accumulate in organisms higher up the food chain. These processes are being measured and analyzed by Keith Lodge, Gerald Niemi and others from the Duluth EPA lab and the University of Wisconsin Superior.

Acid-sensitive lakes

In addition to the more publicized effects of acid deposition on softwater lakes, indirect effects to less productive lakes include increased algal growth resulting from nitrate and ammonium contaminants. While previous studies have focused on the role of phosphorous, NRRI's latest study considers inorganic nitrogen as a threatening ingredient of non-point source pollutants.

"With increased tourism and second home purchases in northern Minnesota, shoreline development is putting more pressure on lakes," said limnologist Rich Axler. "It's the nitrogen from combustion emissions and fertilizer dust that ends up as a non-point source of water pollution. This will be an increasing problem globally and is likely to increase in Minnesota, with potentially important impacts on water quality."

Mine pit lakes

NRRI's investigation of mine pit lake water quality is nearing completion. "We're finding out how mine pit lakes work, what their baseline status is and the changes likely to result under different aquaculture scenarios," said Axler. Models are being developed to provide more accurate predictions of aquaculture loading.

The study also addresses potential impacts on the local drinking water supply. According to Axler, "NRRI's aquaculture research has clearly identified issues and highlighted the need for hydrogeological assessment of Iron Range aquifers."

Environmental chemistry

NRRI assists regulation processes designed to help prevent environmental problems. Chemical Manufacturers Association recently called on scientists to measure factors predictive of toxicity to fish. "Since many industrial chemicals eventually get poured down the drain, new chemicals must pass tests before federal approval," said NRRI's Keith Lodge, co-investigator for the project.

Analytical assistance

NRRI's Central Analytical Laboratory provides services to resource and regulatory agencies and commercial labs. "As more and more water quality data is collected, NRRI can play an important role in improving data quality," said Axler. " We have an excellent staff that's particularly dedicated to research of northern Minnesota water resources."

Among many projects, NRRI has analyzed lake and stream water samples for the Minnesota Pollution Control Agency (MPCA). Special emphasis on Lake Superior has kept NRRI researchers working to understand the fundamental workings of this body of water as well as the effects of contaminants on food chains and regulation factors.

"There definitely needs to be a better understanding of lakes," said Axler. "Lakes are incredibly complicated systems despite their superficial simplicity. There are so many biological and climatic factors to consider, that it's naive to think we can understand lakes by taking a few samples over a couple years."

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Wetland resources

NRRI scientists have delved into examining the function of wetlands in northern landscapes, what happens to wetlands when they are disturbed and how these "natural water filters" can recover. To aid state and federal regulation developments, NRRI provides public agencies such as the U.S. Environmental Protection Agency (EPA) with information about wetlands, particularly the cumulative impact of disturbances such as draining, dredging and filling.

"The U.S. EPA has done a good job in reducing pollution inputs to water from point sources," said Center for Water and the Environment director Gerald Niemi. "The future challenge will be on reducing impacts from non-point sources, many of which will require an understanding of the important role that wetlands in our landscape have in reducing pollution effects on water bodies."

With a $73,000 EPA grant and the help of research collaborator John Bonde, NRRI scientists Carol Johnston, Gerald Niemi and EPA scientist Naomi Detenbeck examined the impacts of wetlands within watersheds. Their pilot study produced important conclusions on the role of wetlands as contributors to water quality and provided the basis for another EPA wetlands study in Illinois.

Water quality data from lakes and streams throughout seven counties in the greater St. Paul/Minneapolis area, including agricultural and urban lands, was compared to watershed information from NRRI's Geographic Information Systems Laboratory. The group found better water quality associated with watersheds in which wetlands were located nearest to stream mouths. These nearby wetlands were found to contribute to improved water quality more effectively than wetlands of the same size further removed. "The position of the wetlands within the watershed really matters when evaluating their importance as a contributor to water quality," concluded Johnston.

The study also revealed that water quality is more eutrophic near agricultural lands and clearer where wetlands are part of the watershed. Total lead concentration levels are lower.

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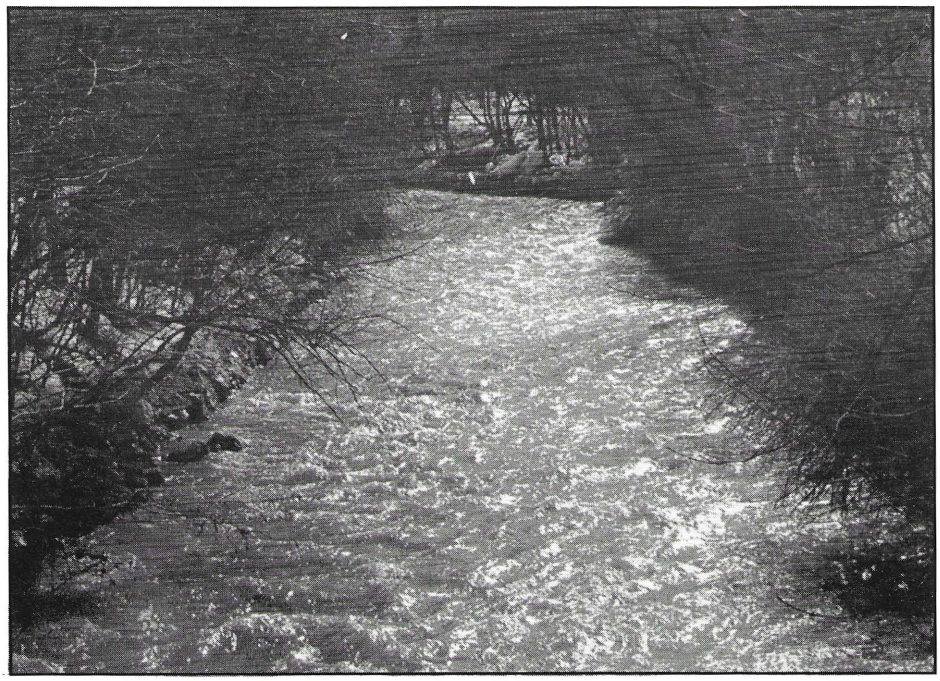


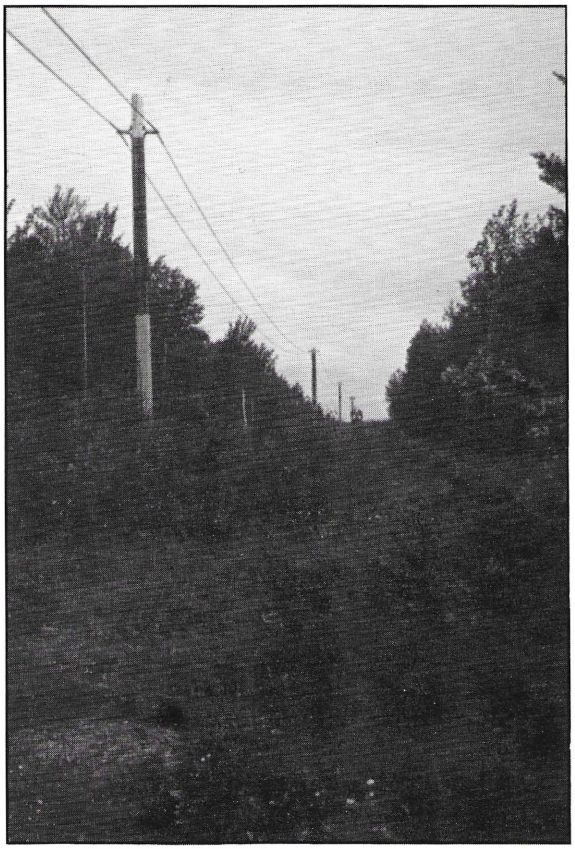
NRRI scientists found better water quality in streams associated with wetlands *nearest stream mouths,* compared to the same size wetlands further removed.

Environmental Studies,
continued

In fact, the study established an important threshold value: Lakes associated with less than 18 percent wetland areas are likely to have higher lead levels than deemed acceptable by the U.S. EPA.

Johnston's studies have uncovered other benefits of wetlands. "Wetland sediments decrease turbidity and trap phosphorous, filtering out these contributors to poor water quality," said Johnston. "Wetlands also play a major role in denitrification, releasing nitrogen into the atmosphere which could otherwise degrade water quality."

NRRI scientists anticipate their continued contribution to Minnesota's knowledge of its precious wetland landscapes, including the St. Louis River watershed.



It looks like a telephone line, but it's really an extremely low frequency (ELF) antenna used by the U.S. Navy for communications. While studying to see if the ELF antenna system affects birds, NRRI scientists are developing the largest bird inventory in the Upper Midwest.

Wildlife & habitat

NRRI's Gerald Niemi and JoAnn Hanowski are establishing long-term bird monitoring programs in the Chippewa and Superior National Forests, to assess the abundance and habitat requirements of select indicator bird species and common birds. Indicator species include the conifer-dependent Blackburnian Warbler, Northern Parula Warbler and Pine Warbler. The study's research collaborators are Rita Hawrot, Carol Peterson, Kent Montgomery and Tom Jones.

Effects of pesticides

NRRI scientists are also evaluating the effects of mosquito control pesticides on biological communities. Methoprene and BTI, used in the Twin Cities' Metropolitan Control District Wetlands, are being studied to determine if their use causes any long term disruption to predator-prey interactions in wetland ecosystems. At the species level, detailed studies feature redwing blackbird populations as well as insects. Niemi and Hanowski are examining the avian component to this study.

Largest bird inventory

For the Illinois Institute of Technology and the Department of the Navy, NRRI scientists are assessing the potential effect of extreme low frequency (ELF) antenna systems on bird species and communities. Researchers have so far concluded that the ELF waves do not affect birds. But in the process of addressing this question, NRRI scientists are producing the largest inventory of natural bird populations in the Upper Midwest. Niemi, Hanowski and UMD's John Blake are leading the project with the help of research collaborators Ann Lima and Patrick Collins.

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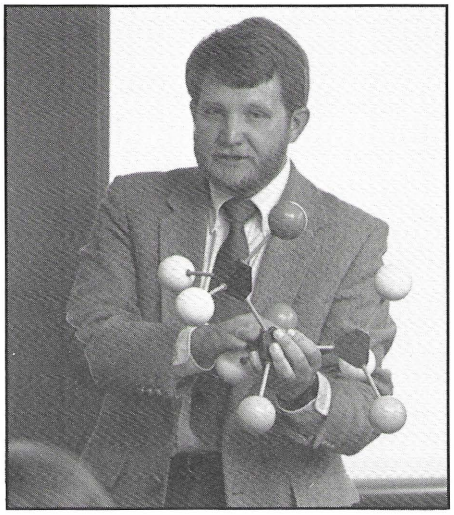
Chemical structure & biological prediction

Working with the U.S. Environmental Protection Agency and several UMD faculty members, NRRI scientists Gerald Niemi, Subhash Basak and research collaborator Greg Grunwald are predicting the hazards of industrial chemicals. They have developed a data base and modeling system for generating predictable correlations between the chemical structure of an organic molecule and its activity in the environment and living organisms.

The project has broad application for evaluating the safety of industrial chemicals in the environment and for use in drug design by the pharmaceutical industry. In predicting the capabilities of organic chemicals to cause cancer and genetic mutations, Basak and Grunwald use statistical and neural network techniques to develop prediction models based on molecular structure. Commercial PC software is also being developed.



Gerald Niemi

Anticonvulsant drug development

Basak, Niemi, Hunter and Lester Drewes from UMD's biology department have lead efforts to produce a hardware and software system for the National Institutes of Health (NIH) for the management of data on more than 14,000 chemicals tested for anticonvulsant activity and toxicity. The project has helped NIH develop a decision-support system for evaluating chemicals for anticonvulsant activity. Computer hardware and software equipment valued at more than $100,000 was installed at NRRI for the project. Also participating are UMD research collaborators Gary Shute, Tim Colburne and Ron Regal, and Ron Sawchuk from the Twin Cities campus.

Sharing information

The Structure-Activity Relationships Consortium (SARCON) was organized by Niemi and Gilman Veith, director of the U.S. Environmental Protection Agency Laboratory in Duluth. Corporations have been encouraged to join SARCON to exchange with public agencies information and software developed for evaluating chemicals using structure-activity relationships.

SARCON provides a common framework for evaluating chemicals and possible causes for concern. The agricultural division of Ciba-Geigy Corporation of North Carolina recently joined the Exxon Corporation, a two-year consortium member, in supporting SARCON with the $30,000 annual membership fee for industries.

"Results of the consortium will improve environmental decisions, reduce the number of animals required for testing and lower costs of producing new chemicals and drugs," said Niemi. "Ultimately, the benefactor will be mankind."

NRRI

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"We helped the company locate readily available red oak lumber and parts," said Reynolds. "In looking at how to make better products than those currently on the market, we created at least one totally new design." When new products were not commercially available, NRRI's manufacturing center provided them. Reynolds' expertise in water-based finishes led American Furniture Craftsmen to use water-based products, which are the most environmentally friendly finishes available.

Casual oak dining furniture is in high demand in the midwest, but few furniture businesses provide a consistently high quality product. "It takes the commitment of people like wood supervisor Bob Anderson, upholsterer Barney Johnson and order coordinator Sean Bakken," said Schneiderman. "We have 80 accounts with a strong reorder business which shows our quality."

The successful young company is receiving more orders in the last four months than it can currently handle. "We know how to make it right, now we need to learn to make it faster without sacrificing our quality," said Schneiderman.

Sphagnum top moss is vacuum-harvested from peatlands.

Peat group helps Minnesota company clean up with new product

There exists a 100 percent natural, environmentally safe product from Minnesota that cleans up hazardous waste spills. Sound too good to be true? Not when NRRI's Peat Group puts research to work.

Back in the early 70s, Finnish and Canadian researchers discovered that as peat is dried, it does not reabsorb water but will absorb oil in amounts eight to ten times its weight. Back in the early 70s, however, the world was not ready for applying this information and the knowledge was basically of academic interest only.

Before the 1989 Exxon Valdez disaster in Alaska, Tim Hagen, an assistant engineer with NRRI's peat group, began managing a research project with the peat research team to confirm the findings of the researchers. The results made them aware that Minnesota had the means to help clean-up oil spills.

"Our job was to take the research started in the early 70s and create a Minnesota product that would perform equal or superior to other non-peat sorbents available in the market," said Hagen, "and we did."

Hagen and peat scientist Tom Levar started confirming test results that peat dried to a 20 percent moisture content would absorb oil but not water. They then looked for the best type of peat that was plentiful in Minnesota

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NRRI's Tim Hagen (left) discusses product improvements with Mat Inc. president Joe Karpik. With the company's new peat-drying process, Karpik expects to hire more help in addition to the group of about 20 he currently employs.

and could be harvested in an environmentally sound manner. In addition, Hagen studied ways to make the dried peat less dusty to increase its marketability.

With test results confirmed, Hagen and Levar teamed up with a local company for which they had been providing technical assistance since 1984: Mat, Inc. of Floodwood. Mat's president, Joe Karpik, was looking for a way to diversify his peat product line and was interested in the research being conducted. He provided a time and equipment match to help further NRRI's research.

"NRRI's contribution has been one of monitoring the type, quality, particle size and moisture content which has resulted in a superior quality product," said Karpik. "NRRI's assistance and efforts have been most helpful, and we trust that our relationship shall continue into the future for economic and regional growth."

NRRI has worked to network the production from Mat, Inc. with the distributors of oil sorbent products in the midwest, southwest and eastern United States. DMS&D of Eatontown, New Jersey, was already in the peat sorbent business, but couldn't find a domestic supply. Ray Cantrell of the U. S. Bureau of Mines told DMS&D's president, Dan Lynch, to contact NRRI's peat group. Hagen put Lynch in contact with Karpik's company in Floodwood.

"NRRI's assistance and technical support has made it possible for us to replace imported peat with peat produced and processed in Minnesota. NRRI's applied research has opened the door for a dramatic expansion of our natural organic peat-based absorbent products and resulted in our new product line--SORBITAL," said Lynch.

Peat group director Tom Malterer looks forward to continued product development success. "NRRI's expertise in research and development and our industry contacts brought together two companies to market a high-quality Minnesota product," he said. "We're now looking at products for specialized spills; our research is going strong."

NRRI

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manufacturing industry create about 100 jobs and now there is particular promise for creating several hundred additional jobs in the next five years. The Institute is also promoting a producers network. Parts of the network, not available several years ago, are now in place.

Partridge River and Woodline are manufacturing dimension panels that can be used by emerging companies such as American Furniture Craftsmen to manufacture furniture. Trus Joist MacMillan's new composite lumber, coupled with overlaying techniques for veneers developed by NRRI research, will provide further opportunity for expanding businesses and attracting new businesses to fill niches in the network. With the support of industry and the State, NRRI's technical and business expertise in wood products has helped poise the region to be technologically competitive.

It is true that NRRI faces some short term hurdles. But its future prospects could not be more relevant or exciting.

NRRI

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process of developing a business plan, Forslund is beginning formal market research. According to Forslund, "The results will either validate Biron's product ideas or prompt him to look at other options."

How does Biron feel about his progress so far? "It's taking me some time, but things are going real well," he said. "From meeting to meeting, Kathy always picks up just where we left off. She's spent time at the mill and quickly learned a business that can be tricky to understand."

In addition to sawmill visits, Biron's work has included a stop at the NRRI Library to look for market research information. He anticipates the realization of his goals. "For now, good cash flow from my current logging activities is providing a strong basis for the future transition," said Biron. Assistance from the NRRI Business Group continues to help provide direction.

NRRI

Project Highlights

• The Blandin Foundation awarded a $260,000 grant to NRRI's BioProducts Division to evaluate increasing aspen production through mechanical strip thinning.

• The U.S. EPA Laboratory in Duluth awarded a $248,000 grant to NRRI's Center for Water and the Environment (CWE) to correct and prevent impaired water quality on the Great Lakes by developing biological indicators required for use by the nation's Clean Water Act. The study will result in standardized methods of water quality assessment for use by resource managers.

• The U. S. EPA Laboratory in Duluth awarded a $50,000 grant to CWE to see if tree swallows can be used as a wildlife sentinel species for determining adverse effects of sediment contamination on wildlife and for identifying the areas of highest contamination for prioritizing clean-up efforts.

• Ciba-Geigy Corporation joined the Structure-Activity Relationships Consortium (SARCON) organized by CWE director Gerald Niemi and Duluth EPA director Gilman Veith.

• The U. S. Department of Agriculture Forest Service awarded a $40,000 grant to CWE to continue building a database for the upper Midwest of over 50,000 bird observations. The project is producing monitoring guidelines and methods, identification of critical species and habitat information for long-range planning.

NRRI Now

The Natural Resources Research Institute was established by the Minnesota Legislature in 1983 to foster economic development of Minnesota's natural resources in an environmentally sound manner to promote private sector employment.

NRRI Staff:
Michael J. Lalich, director
•Center for Water and the Environment: **Gerald Niemi,** director
•Center for Economic Development: **Kjell Knudsen**, director
•Center for Applied Research and Technology Development: **Thys Johnson**, director
•*NRRI Now* editor: **Lisa Hawkinson**
NRRI Now is published quarterly to provide information about programs and projects at the Institute. For information about the Institute, call 218/720-4294.

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Natural Resources Research Institute
University of Minnesota, Duluth
5013 Miller Trunk Highway
Duluth, Minnesota 55811-1442

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