



Symbol of renewal

Living with Lakes Center for freshwater restoration and research, Sudbury, Canada

Regional competition Holcim Awards Bronze North America; jury appraisal page 66

Surrounded by the raw beauty of the Canadian wilderness, the city of Sudbury experienced environmental devastation. At the heart of the area's ecological recovery is the Laurentian University Cooperative Freshwater Ecology Unit – which has outgrown the modest cottages that house it. The new Living with Lakes Center exemplifies the region's metamorphosis and the importance of protecting the “blue gold” of the 21st century, freshwater.



From Toronto, the drive up to Sudbury, a city of around 160,000 people in northern Ontario, takes about four hours through a landscape dotted with lakes. The blue lakes and rocky shores of the region have shaped the national psyche, leaving an imprint of on some of Canada’s best literature, art and drama.

A three-hectare Ramsey Lake waterfront site adjacent to the Laurentian University campus will be home to the research facility. The Living with Lakes Center (LLC) is being lauded

by the university as the symbol of environmental protection and restoration, as well as a drawing card to attract students, faculty and world-class aquatic researchers to Sudbury.

A special emphasis in the design work will be on constructing an energy- and cost-efficient building that includes passive solar heating and a “green” roof covered with native species including blueberry bushes to absorb heat in winter and keep the facility cool in summer. A filtration system will collect water for use in the building and reduce their reliance on city

services. The new research and teaching center will physically contribute to improving water quality, promote creative and collaborative research, and minimize operations and maintenance costs.

From loggers’ camp to boom town

The story of the mining in the region starts a long way back – around two billion years in fact, to a time when a huge meteorite struck the planet and created the geological region known as the Sudbury basin. The massive impact from the meteorite melted the



The Sudbury basin was formed about two billion years ago.



Sudbury lies at the centre of more than a million lakes in the Boreal Shield Ecozone.



Earth's crust and created a pool of molten magma in which the heavy mineral nickel sank and concentrated in a layer.

Initially, Sudbury was just another sleepy loggers' camp and this vast deposit of nickel ore went unnoticed in the early years of European settlement of the district. That changed when the Canadian Pacific Railway went through in 1883 and construction works uncovered the vast underground riches. The "Nickel City" of Sudbury became a typical mining boom town of the early 20th century.

A black landscape

A high concentration of sulfur was found in the ores – released during the smelting process, it fused with water vapor in the atmosphere; acid rain was the result. For decades it drenched the local landscape, reducing it to barren wasteland. Trees cut down for fuel compounded destruction. Ero-

sion exposed bare rock. What was once colored granite was soon coal-black from the fumes.

There are not many places on Earth where such complete environmental degradation could be witnessed. Already likened to a moonscape, the training of Apollo astronauts in the area in 1971, identifying rare rock formations caused by meteorite impact, seemed quite ironic at the time.



From far away, the Superstack does not seem particularly huge ...

Poisoned lakes

Although environmental protection was not a mainstream concept as it is today, the world's largest nickel smelter constructed its Superstack in 1972 to address environmental performance. At 381 meters it is the tallest chimney in the western hemisphere, and the second tallest in the world. It dwarfs the Eiffel Tower and most New York skyscrapers. The intention was to take the sulfur oxide so



... but it is truly colossal. At 381 meters in height, it is the second tallest stack in the world.



high into the atmosphere that its dispersal over a far greater area would reduce concentrated toxicity – but by then much of the damage had already occurred. In a 200 kilometer-radius around Sudbury, acid rain destroyed flora and fauna, and poisoned lakes.

Sudbury lies at the centre of more than a million lakes in the Boreal Shield Ecozone. “We know that acid rain has poisoned around 7,000 lakes in the region,” John Gunn says. The biologist is a freshwater ecology expert, and holds a research chair in stressed aquatic systems at the city’s bilingual Laurentian University. “The extent of the disaster was almost inconceivable – in lakes within about 20 km of the city nearly all of the fish were gone.”

Engagement for environmental protection

John Gunn can make these statements in the past tense because much has changed

over recent years – principally due to the untiring activism of people like himself. The building of the Superstack kick-started a whole range of public and private rehabilitation efforts – the city’s water reservoir, Lake Ramsey, was cleaned up; 9 million trees were planted over the years. At the 1992 Rio Earth Summit, Sudbury was one of 12 cities around the world to receive a special award for their community-based environmental restoration strategies.

“What can we do to strengthen the positive change we see?”

The decrease in sulfur dioxide emissions from the nickel smelter is as important for the ongoing environmental health of the region as any strategy to rehabilitate past actions. Mining technology and better filter systems have reduced emissions by 90 percent over the past 30 years. But there is much to do before this area of northern

Ontario can be described as a natural paradise again.

Important efforts in this regard are being conducted by John Gunn and his team at Laurentian University. The university has a reputation for innovation in mining sciences, but also in environmental research. For the past 20 years, its Cooperative Freshwater Ecology Unit (CFEU) has been a partnership



The internationally-renowned Cooperative Freshwater Ecology Unit currently calls four cottages home but the team’s needs have outgrown these simple structures.



“Our goal is to make our ecological footprint as small as possible.” **John Gunn**

Reminiscent of the glacial sheets that carved the rugged landscape: the Living with Lakes Center for freshwater restoration and research (LLC).

between industry, public authorities and researchers looking at the effects of acid rain on the region’s lakes, streams and wetlands. “We conduct studies to see if the measures implemented to date have improved water quality,” he explains. “Does fauna return when acid rain disappears? Why do some lakes recover more quickly than others? What can we do to strengthen the positive change we see?” These research questions, amongst others, inform projects undertaken by the CFEU. Their comprehensive approach has seen all 7,000 lakes studied by the scientists and their students.

acid rain. But you would not realize it on the basis of the four modest cottages which house the research unit. Previously used by bush pilots, the simplicity of the accommodation does not disturb John Gunn. “It’s a cozy atmosphere – our workspace reflects

the work we do,” he explains. “Our goal is to make our ecological footprint as small as possible, so you won’t see us in an ivory tower!” Yet the needs of the unit – in terms of space and facilities – mean that these homey cottages will soon be part of CFEU

Simple accommodation

This is one of the most important places worldwide in which to study the effects of





history. Six years ago John Gunn began to think about his vision for the future – its name, the Living with Lakes Center for freshwater restoration and research (LLC); its atmosphere, no less cozy than the cottages of old; and its aim, to protect the 21st century’s “blue gold”, freshwater.

Of glaciers and forests

Planning for the new center began in 2006, including its location – below the university on the shores of Lake Ramsey. The architectural studio Busby Perkins + Will was engaged – the Vancouver firm is well-known for its green concepts. Together with a local architect, Jeff Laberge, they set to work designing a structure symbolic of Sudbury’s engagement in environmental rehabilitation.

First impressions stick – the building looks like a glacier curving down toward the lake. “We wanted to design something represen-

tative,” Jeff Laberge confirms. “For some the form is reminiscent of a glacial sheet that once scoured this rugged landscape. And the building’s wooden exterior tells the story of the pine forests that once dominated the region.” Coupled with its aesthetic presence, the two-storey center will be constructed to meet LEED’s platinum standard. “It’s a strong symbol for a sustainable construction to be placed in the midst of an industrial city” he says. “It’s a symbol for the future – from Nickel City to Science City.”

70 percent more efficient

The number of measures included in the new center to minimize its ecological foot-

Whether from offices or labs, researchers and students can look out over Lake Ramsey, a constant reminder of the importance of their work.

print is like a wish-list of all things sustainable. Wind turbines; solar-heated water; green roof to reduce storm-water run-off; storm- and grey-water treatment; natural day-lighting; energy-efficient lighting; appliances and smart building systems to supply or save energy.

Especially notable are its heating and cooling systems. In winter, the temperature can drop to below –30°C. Keeping things comfortable calls upon a clever mix of high-performance thermal envelope, ground source

“It’s a strong symbol for a sustainable construction to be placed in the midst of an industrial city.” **Jeff Laberge**



heat pump, biomass-powered heating, hydronic radiant floor heating, and various passive measures.

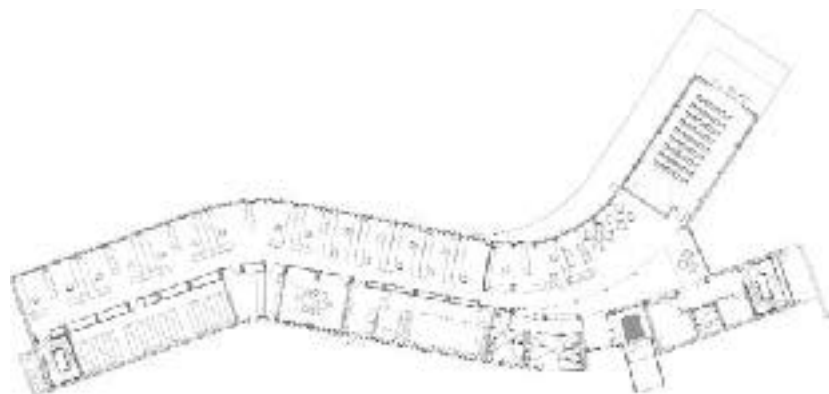
The consequences of climate change are high on the agenda for the center – the building is designed to the climate in 2050. John Gunn laughs: “Even then, it will still be quite cold for us up here.” All strategies contribute to the facility being 70% more efficient than a conventional building – an impressive result which will boost eco-industry in the region and make a significant impact on construction employment and specialized technologies.

Buildings as filters

The design of the building is a collaboration between the architects and the university’s researchers. “We agreed to three goals,” John Gunn remembers. “Firstly, we wanted the location to profit from the center being here

– the water quality should improve.” The LLC sets out to disprove the adage that the most sustainable building is the one that isn’t built at all. Its limestone foundations will neutralize metals in the acidic soil. “If you want to rehabilitate a patch of ground, you generally start by spreading crushed limestone over it,” he explains. The center will act as a filter to improve Sudbury’s drinking water supply. Driveways and parking lots are permeably paved over limestone to enhance the effect.

The researchers’ second goal was to maintain the good working atmosphere of their current home. “We want everyone to be happy working here!” John Gunn says. “The atmosphere in the cottages is great. We don’t want to lose it.” In the new center, at least 60 people will undertake creative, collaborative research. Their working area of 2,700 square meters is generous. “We build for now,” he explains. “But with an eye on the future. We want to grow as a team and contribute to more projects.”





Helping nature help herself

Rehabilitation measures are widely used in the mining industry, especially in open-cut operations which require large surface areas. Often nature is capable of healing itself over time, but an initial kick-start to the process offers the opportunity for speedier recovery.

Depending on the objectives for the rehabilitated site – simple revegetation; conversion to another public use such as parkland or sporting facility; perhaps incorporating a lake or wetland environment – various strategies are used. They can involve anything from contaminated soil removal, contouring of slopes, backfilling of previously worked mine sections or simply adding topsoil and planting appropriate flora across the site.

Biologist John Gunn and architect Jeff Laberge: “What can we do to strengthen the positive change we see?”

The huge windows of the open-plan office space on the second floor overlook the lake. Researchers and students are ever-reminded of the importance of their work. A second building houses the labs and all associated equipment – water probes, nets, boats, vehicles, and so on.

Contributions from industry

The third goal is financial. Ongoing maintenance is set at around USD 30,000. “CFEU is not interested in making money,” John Gunn says. “We’re interested in providing high quality research at no cost. We know that if our costs are higher than budgeted, we won’t be able to move to the new center.”

Behind this practical reasoning, however, lies a fundamental principle – spending as little as possible on energy. “That way we have

more to invest in research.” The center will demonstrate a commitment to economic, social and environmental efficiencies – “it’s a sustainable choice, for worker productivity as much as reducing energy costs, and water consumption.” To build the center will cost USD 15 million. Most funding has been received – from industry, the university, and public funds – who together have the opportunity to support the building of a sustainable center for the future.

“Restore, reduce and renew”

“We have dedicated our lives to the struggle against environmental pollution, but industry itself is not the enemy,” says John Gunn. The mine managers here are young, environmentally-conscious – some were students

here at the university.” Partnerships between university researchers and industry yield results. “We have the opportunity to conduct research and share experiences that can have positive impacts elsewhere – collaboration rewards us both.”

Likewise, Jeff Laberge, need only look out his car window on a drive through his home town to see the rewards of this collaboration. “A year ago, there was nothing there,” he says, pointing to a verdant patch of ground. In Sudbury, it is just as possible to witness how fast nature can be destroyed as it is to see her strength to regenerate. A mantra of “restore, reduce and renew” guides the CFEU team’s work – a case of living lakes and living with lakes, both symbolically and literally.

“We’re interested in providing high quality research at no cost.” **John Gunn**