



Brock University

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## Measuring success

Sponsored research and scholarship at Brock University continue to grow at exceptional rates. Less than three years ago, Brock identified a goal of attaining \$14 million in sponsored research and scholarship by 2010. It is highly likely that we will attain this goal in FY 2005-06.

While research funding is only one of many metrics with which research and scholarly intensity can be measured, it has emerged for politicians and the public as one that is easily understood. Other metrics or indicators include publications in high impact peer reviewed journals, number of new discoveries disclosed, number of patents filed and issued, and number of licenses executed. Yet, what the metrics miss is the human factor – the ideas, imagination and commitment of research faculty members and students. Creative individuals, many of whom are engaged at Brock as faculty and students, will determine whether a novel discovery leads to a paradigm shift in the way we see the world and it is these human decisions that have a profound impact, yet are not easily quantifiable.

Research and scholarship is more than just metrics, and the Grants Facilitators in the Office of Research Services (ORS) provide effective assistance to faculty as they transform their ideas into competitive grant applications. As the ORS develops a strategic plan for the next five years, we will focus on the services faculty members require to maintain their competitive edge while preserving our commitment to excellence in science and scholarship in all of our disciplines.



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## Using satellite technology to inventory Canada's wetlands

This year, news of Google Maps has been making its way through the six degrees of e-mail. You can now hop on Google and take a look at your house from a bird's-eye point of view, almost no matter where you live. Anyone can. The stuff of James Bond is now at our fingertips, thanks to the search engine whose name has become a verb.

Actually, Google is only a distributor for data collected externally by a process called remote sensing – or by any other name, satellite imaging. Remote sensing technology, wherein satellites or aircraft canvas large areas of land to compile photographic maps at various scales, has been used for years by folks ranging from the military, to business, to geographers such as Dr. Marilyne Jollineau.

Dr. Jollineau is interested in using remote sensing to study the flora that comprise Canada's wetlands. "We have a quarter of the wetlands of the world," she explains, "so in my opinion we're obliged to protect them. We've lost 70 per cent of the wetlands in southern Ontario; of those that are remaining, many have been degraded. We've made international commitments to protect them, yet we have no way of measuring exactly their extent, their distribution, or their condition.

"One fantastic way is to look at it from space," continues Jollineau enthusiastically. "Many people have avoided remote sensing technology because of cost. But cost is coming down, and that opens up a whole new market.

"We can now look at large geographic areas with very high spatial resolution. We can also acquire hyperspectral data; these data can provide hundreds of measurements across the electromagnetic spectrum. Before my eye perceives a problem in a plant, we can measure a shift in its reflection of infrared light, indicating a degraded condition."

Wetlands, upon which cities such as Toronto and Windsor were originally built, are lush, marshy terrains that are home to a wide range of unique life. Most people view



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**Dr. Marilyne Jollineau**

wetlands as at best natural window dressing, and at worst as havens for diseases associated with sitting water, such as West Nile. But Jollineau points out that they play many essential roles, including flood water retention, habitat for rare and endangered plants and animals, and most importantly, water filtration.

Dr. Jollineau is interested not only in wetlands, but also in the methodology of remote sensing in general. "Most people assume that we can just apply remote sensing to anything and they don't realize that it's a little more difficult. What can and can't it do? For example, there are floating communities of plants just below the water surface that are a primary food source for mallard ducks – can we detect and map these communities? Can we distinguish individual species, which to date we've not been able to do?"

The best way to test the value and limits of remote sensing is to take direct

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measurements in the field and compare them with satellite data, gathered either from Canadian aircraft or purchased from US public satellites.

“Canada plans to launch its own satellite hyperspectral sensor in 2006,” says Jollineau. “I think what we’ll see in the future is that we will take a leading role in the use of hyperspectral remote sensing to improve our understanding of shoreline as well as inland wetland environments.”

If Dr. Jollineau is right, she has positioned herself as an expert in a field that is about to explode in Canada. In the meantime, she brings a unique bundle of expertise to Brock University as one of the Department of Geography’s latest

faculty additions.

Dr. Jollineau’s research has been funded to date by a BUSRA.

~ Giles Holland

## Know your foe: Dry spells can be more than just a nuisance

Doctor Francine McCarthy, Professor of Earth Sciences, is one of a team of ten researchers in Ontario and Rhode Island who study aridity in the natural history of Georgian Bay. McCarthy herself studies the microfossil record in the sediment, looking at evaporation and dryness in the Bay’s past.

Sediment continuously builds at the bottom of any body of water, and as it does so, it brings

traces of the environment along for the ride – traces such as the remains of micro-organisms, and pollen and seeds from the flora of the surrounding land. Researchers extract long cores of such sediment and inspect the layers in them, which, like rings in a tree, correspond to specific times in the past. The traces found in each layer give clues as to what kinds of conditions existed in and around the water at that time.

It so happens that particularly interesting clues are found in Georgian Bay at points 7500 years in the past in sediment layers that are now over 50 metres below the water surface. Here McCarthy found pollen from plants like cattails and water lilies – in other words, traces indicative of shoreline. She concludes that there may be at least 50 more metres of water in Georgian Bay today than there were 7500 years ago.

The question: why? McCarthy explains, “In the mid to late 90s, I had a graduate student work on these microfossils that are found in the lake – they’re called thecamoebians – they’re like an amoeba with a shell. There are different

species, and the different species like different conditions of temperature, of nutrients in the water, etc. In the sediments that were deposited at around 7500 years ago, it’s interesting that

the thecamoebian species that were abundant were the same ones that today would be found in a salt marsh.”

So the answer, McCarthy suspects, is aridity: “We’re nowhere near the ocean; there’s no way the ocean ever came into Georgian Bay. But what happens is, when you evaporate a lake it’s like boiling soup on a stove; it gets saltier and thicker, because you lose the water, but you don’t lose the salt.”

McCarthy’s work can furnish empirical data that can be used to inform numerical models of future climate change. But in addition, Dr. McCarthy sees an important public relations element.

“Life is far more sensitive to changes in aridity and moisture than it is to changes in temperature,” she says. “We can only survive three days without water, but we can shiver for a lot longer. And the economic ramifications of not

having enough moisture are huge.

“Consider how much water you consume in a day drinking, cooking, bathing, cleaning, washing. And that’s nothing compared to the amount of water that is used by industry; any large component of the economy depends on huge amounts of fresh water.

“Who knows why certain things catch the imagination and other things don’t,” McCarthy says. “Everybody knows about global warming, but no one knows about aridity. Global warming is not nearly as important in the short-term, in the term that should interest politicians and planners.”

McCarthy and her collaborators will continue their research in an effort to better understand aridity in the Georgian Bay of the past and its causes. She hopes that community leaders and politicians will become more aware of the potential impact of aridity on the environment and, ultimately, the lives of Canadians.

Dr. McCarthy’s research is funded by NSERC and by the National Science Foundation (NSF).

~ Giles Holland



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