THE WATER IS RISING

ARE WE PREPARED FOR THE CONSEQUENCES OF STEADILY-RISING SEA LEVELS?

BY CHRIS BENJAMIN

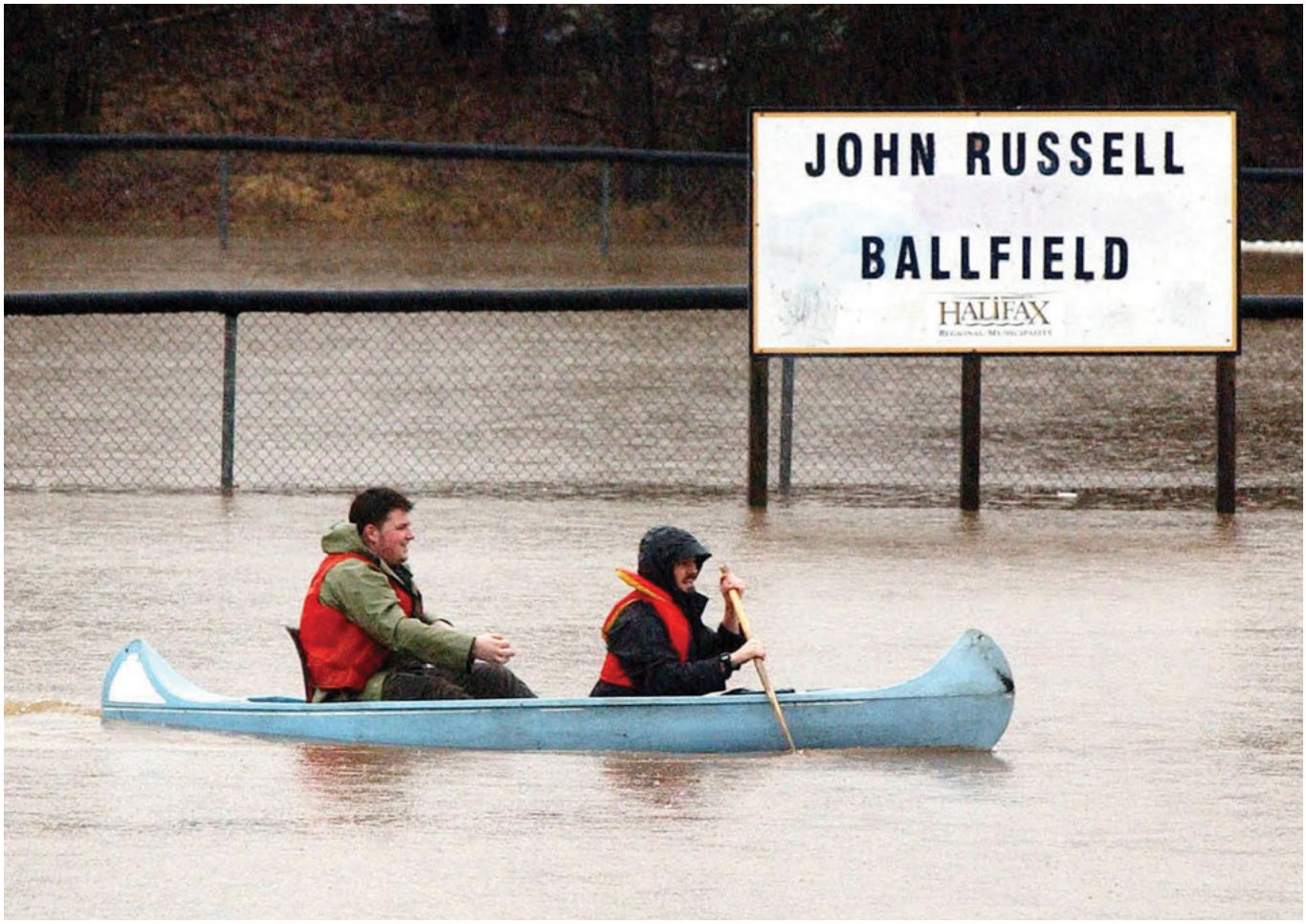

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PHOTO: APPLIED GEOMATICS RESEARCH GROUP, NOVA SCOTIA COMMUNITY COLLEGE, APPLIED RESEARCH

Tim Webster (centre) and team members carry a turbidity sensor from the Northumberland Strait as part of their research on water clarity and bathymetric lidar mapping.

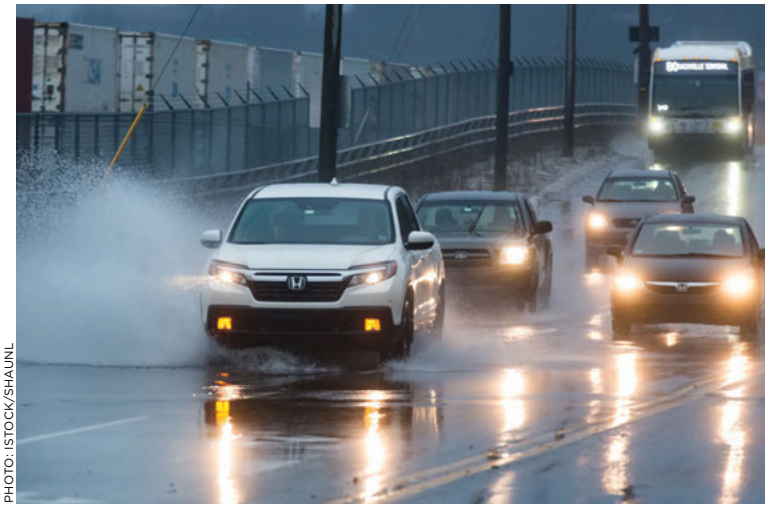

PHOTO: ISTOCK/SHAUNL

Recall Hurricane Juan, the once-in-50-years storm that ravaged Halifax in 2003. It uprooted swaths of seemingly unmovable trees, knocked down power lines, forced street closures, flooded the downtown with seawater (and marine animals), caused $300 million in damage, and killed eight people.

Now imagine a storm like that in 2050. Or 2100, when such extreme weather events will likely be much more frequent. Juan hit so hard in part because the Atlantic Ocean was unusually warm.

It's only getting warmer.

Halifax's waterline will look much different in 2100. Global sea levels will be as much as 2.5 metres higher than they are now. And don't forget the increasing rates of coastal erosion, or the fact that we're sinking.

Tim Webster, a renowned geomatics researcher at NSCC, has spent two decades using computer models, remote sensing equipment and geographic information systems to map, monitor and model erosion and flood risks in an age of rising tides. In a map of downtown Halifax under various storm scenarios 100 years from now, the water hits Lower Water Street and the Armdale roundabout. The maps don't account for subsidence (seriously, Halifax is slowly sinking) or for waves; they are set for a still-water flood level.

"I'm not panicked," Webster says of the results of his own work. "I'm happy about governments and planning associations that don't shy away from the data and want to make it accessible to the public, and are willing to say to people, 'You can't build here.'"

UNCERTAIN FUTURE

According to the United States National Oceanic and Atmospheric Administration (NOAA), "The pace of global sea level rise nearly doubled from 1.7 mm/year throughout most of the twentieth century to 3.1 mm/year since 1993." The causes are glacial and ice-sheet melt, plus thermal expansion of seawater. All due to global warming.

NOAA says there's more than a 90% chance that the sea will rise at least two metres by 2100. It recommends that coastal cities prepare for a 2.5-metre rise.

The Intergovernmental Panel on Climate Change (IPCC), which draws its conclusions from scientists and data from around the world, projects a 1.3-metre increase by 2100, in a recently leaked draft report. Millions of people will be displaced in North America alone.

"Accounting for Arctic melt waters could make the numbers higher," says Eric Rapaport, an associate professor in Dalhousie's school of planning. His work focuses on land-use change, climate change, and vulnerability analysis. "And there is still uncertainty with that issue," he adds. "The melting could accelerate." Greenland and Antarctic ice sheets are melting faster than scientists first projected.

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Predictions keep changing because technology and data keep improving. Alex MacDonald, a climate-change specialist with HRM, says any rules relating to sea-level rise are subject to change based on new information. And he is actively looking for new information.

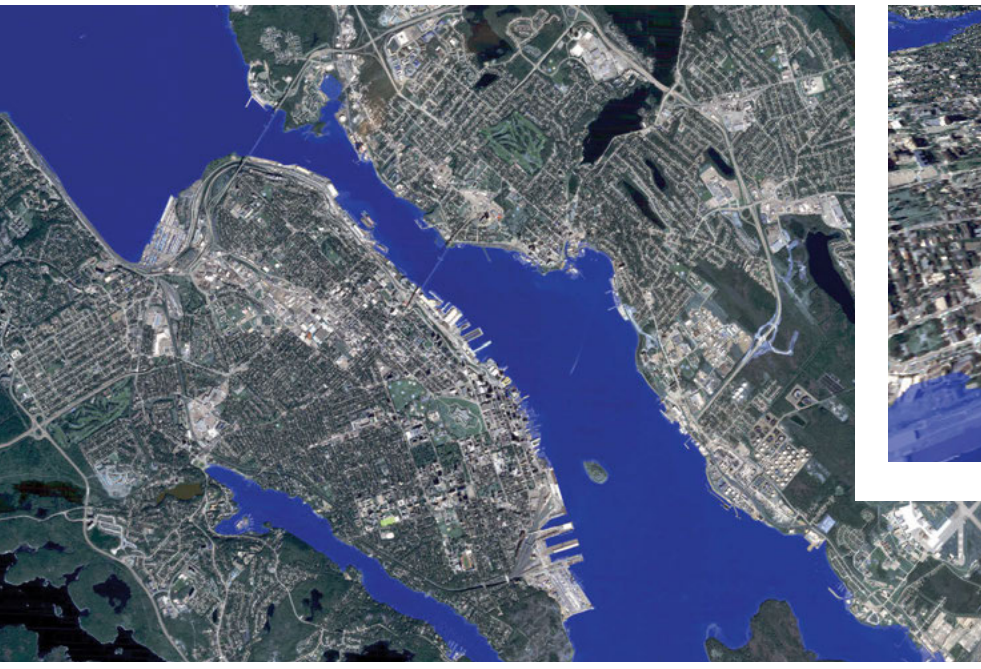
"We've recently acquired new [Light Detection and Ranging tools] to create a detailed digital elevation model for the entire municipality, which will be used to better understand coastal and inland flood vulnerability due to climate change," he explains.

Based on that model, Halifax will reassess the vulnerability of coastal properties. The new model, MacDonald says, "will help us map out vulnerable areas and better understand what infrastructure could be at risk." HRM also plans to continue working with communities, building on a community-based mapping project in Eastern Passage-Cow Bay, on climate adaptation and emergency preparedness.

BEST LAID PLANS

There is good news and bad news, Rapaport says: "The city has done a really good job with its bylaws to keep the waterline a living shoreline, and designing for storms."

He points to the $200-million mixed-use (including 130 residential units) Queen's Marque development, as a harbourside property that is planned with sea-level rise in mind, "with electrical equipment above ground, and the second floor is residential so people aren't in harm's way." The Armour Group, which owns the development, situated its ground floor based on sea-level rise projections from the Bedford Institute of Oceanography.



Tim Webster's sea-level rise modelling, exploring an extreme scenario in which a tsunami strikes the city.

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Nancy Anningson, the senior coastal-adaptation coordinator at Ecology Action Centre, also feels HRM is making strides. "Halifax has done some waterfront-specific activities in the past two or three years," she says, "including increasing the vertical allowance amount."

According to Alex MacDonald the amount, which is set for residential use only, is "2.5 m above the Ordinary High Water Mark in Halifax Harbour" under the city's Land Use By-Law. "The current vertical allowance/setback accounts for the worst-case storm surge and flooding conditions expected during a storm in 2100."

Anningson notes that while Halifax has good setback rules, there are too many exceptions. Numerous properties have been subdivided so that it's just 15 metres from coast to road.

MacDonald also acknowledges the vertical allowances and setbacks do not apply to commercial properties.

On the provincial side of things, Nova Scotia is set to announce its Coastal Protection Act, after a decade of lobbying from environmentalists. "It will prevent coastal ecosystems from being tampered with," Anningson says. The Act also aims to protect sand dunes, saltwater marshes, and wetlands, all key features in protecting from flooding and slowing coastal erosion.

FILLING THE PLANNING GAPS

Setback rules are good and necessary. But still absent in Halifax is a formalized, proactive plan for developing responsibly in the new reality. A year ago, the *Globe and Mail* reported that Develop Nova Scotia (formerly the Waterfront Development Corporation), the largest Halifax waterfront property owner, was drafting such a plan.

"They do need a master plan," says Rapaport. "They can build all the buildings out of reach of the sea, but the roads behind them—Lower Water Street isn't getting any higher. When it floods, then what?"

MacDonald says he isn't aware of a plan being developed by DevelopNS, but that "they want to be part of any conversation on a plan being led by other stakeholders." He says HRM is "engaging with DevelopNS" on climate strategy around development and harbour use.

Ultimately, an effective plan will need to further curb development in potential flooding areas, an idea that private property owners have in the past been prone to resist.

"Most of our coastline is appropriate land use," Rapaport says. "But we have some residential properties for sale that could be flooded. Developers are continuing to sell waterfront properties. The city needs to take a stance on single detached developments being sold within 100 metres of the shore."

It's a safety issue and a financial one. Victims of flooding usually expect compensation from governments or insurance companies, preventable costs that are born by everyone as taxes and rates increase.

The solution, Rapaport says, is as simple as Halifax enforcing a flood-line map preventing new development in high-risk areas. If that seems too radical, it's worth taking a close look Tim Webster's maps.

Decision makers do know that our environment is changing, and they are making initial efforts to change with it. It's no longer optional. H

READ MORE

This story is part of a special package of features from *Halifax Magazine* and Advocate newspapers around the Maritimes exploring the effects of rising sea levels. Visit **halifaxmag.com** for more.