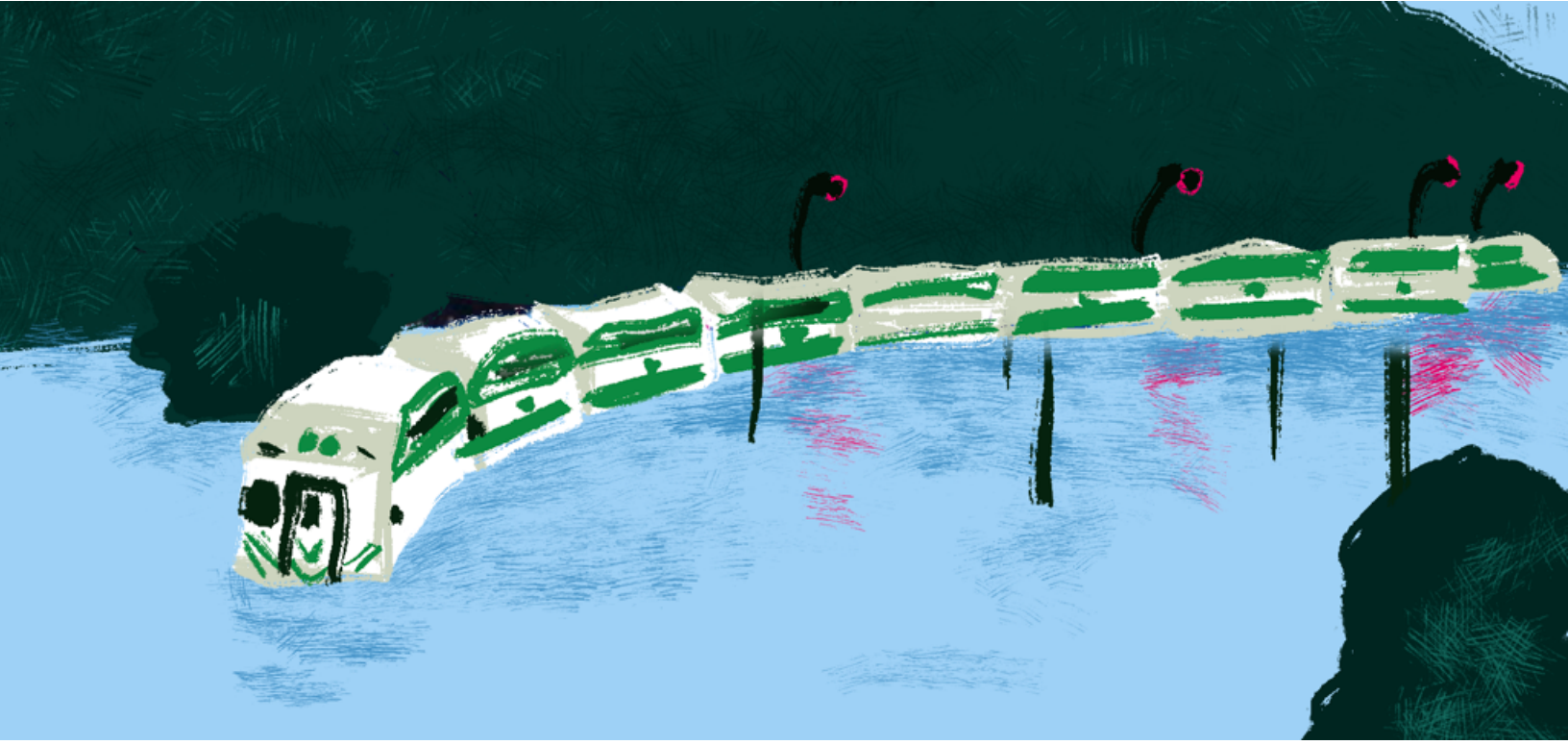

Illustration by Fred Reibin

Drowning Commuter Trains

The journey from budding hydrologist to flood forecaster

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After finishing my MS degree specializing in hydrogeological modelling, I started looking for Ph.D. opportunities in Canada.

Even though I was intrigued by studying surface and groundwater, I picked groundwater over surface water for further studies. I used to hate surface water because it's too fast. At least with hydrogeologic models, you have time to model and predict where the water will go. While searching for specific water research groups, I came across Prof. Coulibaly's McMaster University website and noticed incredible water resource research. Even though his research interests are mainly based on hydrological modelling, I saw that my modelling knowledge could fit into the program. I reached out to him for Ph.D. opportunities.

My research interests reversed after the interview with Prof. Coulibaly. At the time, he was located in the Greater Toronto Area. He told me I needed to do flood forecasting in Toronto. I was in the USA at the time. I searched for pictures of the 2013 Toronto flood and saw an image of an entire commuter train drowning in water. I thought, "This is what's going on here"? So, when they asked if I would help them, I thought, "Okay, I'll try". One of my first discoveries was that flood forecasters use basic numerical methods to predict when damaging floods might occur. My enthusiasm for surface water was sparked, and I moved to Canada to help with flood forecasting.

Fortunately, as a budding hydrologist, I met everyone I needed to at the right time. Many fellow graduate students and postdocs around me focused on different aspects of flood forecasting systems, such as input data, hydrological modelling, hydraulic modelling, and forecasting. Even though I concentrated on precipitation input data, it showed me a bigger picture. Whenever I had a question, I would turn my chair and ask someone working on another aspect of flood forecasting. Initially, I focused on continuous daily hydrological modelling. I realized that the flood that caused that train to drown was a flash flood. Flash forecasting was something different, so I met Dr. David Sills from the King City weather radar station. "Why don't you try using near real-time radar estimated precipitation to produce real-time flood forecasts?", he suggested.

During my Ph.D., I only focused on precipitation input to flood forecasting models. I was based in Hamilton and got hands-on experience with flood forecasters in Toronto, St; John's, and Winnipeg as an intern. Since I was in Eastern Canada, most models we implemented addressed the physiography in that region. I began to understand that flood forecasting is a provincial responsibility, and each province has different conditions and approaches. I heard different stories from hydrologists in central and western Canada and became interested.

During a conference, I met Prof. Tricia Stadnyk, and we started talking about prairie pothole modelling in western Canada. I learned that the hydrology of this region is very different from heavily urbanized Toronto. After my Ph.D., I moved to the University of Calgary and started working with researchers at UC-HAL under the supervision of Dr. Stadnyk and Dr. Alain Pietroniro. For my Ph.D. research, I implemented several models from scratch. I realized that data processing takes so much time there is little left to address the research question.

So I got to work with the UC-HAL research group, collaborating with Dr. Martyn Clark at the University of Saskatchewan to establish a stream flow forecasting system that produces forecasts for three rivers in Alberta in near real-time. I have now experienced all the steps of flood forecasting.

The next step would be sharing this system with operational users to validate it before making it available to others. Most exciting is that we have a preliminary flood forecasting system that follows the FAIR principles for data: findability, accessibility, interoperability, and reusability. Public availability allows people from all disciplines to work on the models and help improve them.

I started out as a 'surface water hater' and am now delighted by surface water!

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