

# Environmental Engineering

# Water Resources Engineering

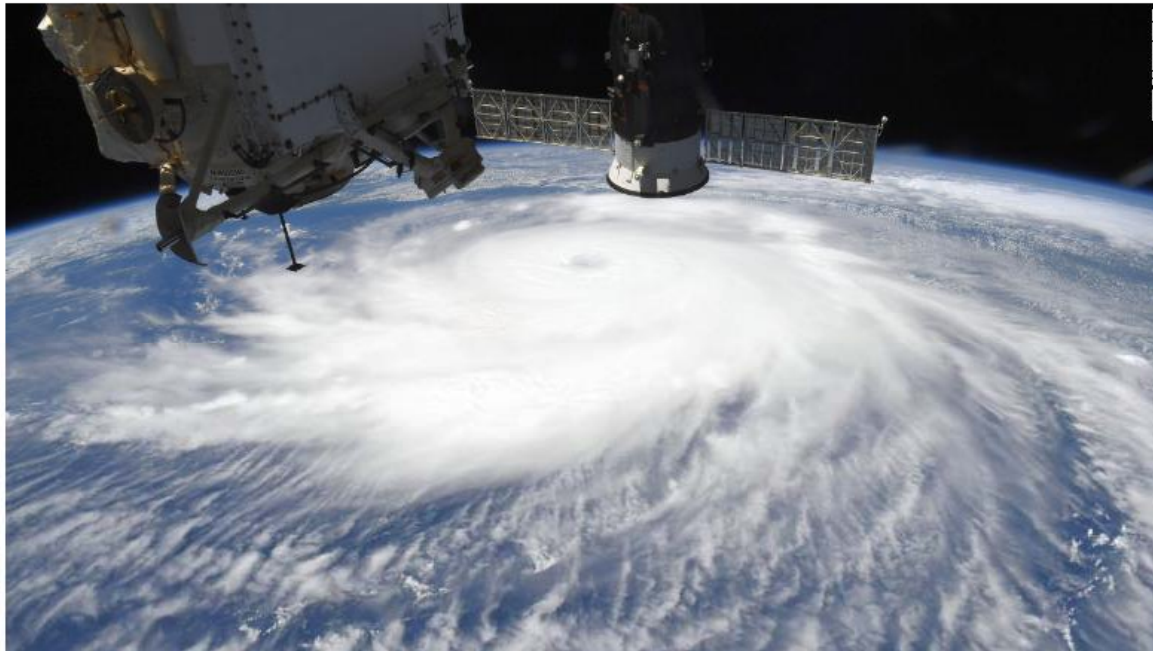


# Climate change didn't cause Hurricane Laura but it did make the storm worse



By [Allison Chinchar](#) and [Brandon Miller](#), CNN meteorologists

🕒 Updated 4:00 AM ET, Sun August 30, 2020



A view of Hurricane Laura taken from the International Space Station on Wednesday, August 26, 2020.

**(CNN)** — Hurricane Laura was a formidable storm when it made landfall in Louisiana on Thursday.

Laura broke multiple records, including the highest water level ever recorded at the Mermentau River gauge at Grand Chenier location. The gauge topped out at 17.14 feet, more than 4 feet above the previous high of 13 feet from Hurricane Audrey in June 1957, according to the [US Army Corps of Engineers](#).

NEWS CLIMATE

# Emissions dropped during the COVID-19 pandemic. The climate impact won't last

'Green' policies built into coronavirus recovery plans could leave a more permanent mark



Stay-at-home orders to slow the coronavirus' spread caused cuts in greenhouse gas emissions from transportation. But traffic lulls on normally busy highways, like the Brooklyn-Queens Expressway (pictured) in New York City, won't curb climate change.

# India water crisis flagged up in global report

By Navin Singh Khadka  
Environment correspondent, BBC World Service

🕒 6 August 2019

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GETTY IMAGES

Several states in India are facing acute water shortage

**The anger over water scarcity is palpable at a farmers' protest in Dharodi village in the northern Indian state of Haryana. Thousands of protesters from several villages have been demanding clean drinking water for nearly a month and half now.**

Rajpati Banwala throws her hands up as she chants slogans, demanding water with hundreds of other women and men under a huge tent.

"Even our livestock cannot drink the water the government gives us twice a week," she says, adding that she has been spending 500 rupees (\$7; £6) a month to buy

News / Insight

## Lake of Shame: Ontario's pollution problem

Viagra in the water, fish unfit to eat, environmental standards ignored. Critics say parts of Lake Ontario are 'as bad as it's ever been.'



Tweet

3

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reddit this!



By: [Antonia Zerbisias](#) Feature Writer, Published on Fri Jul 08 2011

Just below the soaring Scarborough Bluffs, 17-month old Piper Clark scoops the fine sand into gloppy pies. Her brother Reed, 4, bravely ventures deeper into the water.

Around them on this hot summer day, bikini-clad girls frolic and tease boys in the

## News

## Ontario residents generate more garbage during pandemic

June 15, 2020  
by SWR Staff

### Categories

[COVID-19](#)  
[Industrial,](#)  
[Commercial &](#)  
[Institutional \(IC&I\)](#)  
[Municipal Waste](#)

With the support of Ontario municipalities, representing close to 8.5 million residents, data has been gathered to better understand the high-level impacts of COVID-19 on residential and commercial waste generation. Since the week of March 9<sup>th</sup> data has been tracked and compared to the same period in 2019.

While certain waste management restrictions remain in place in many municipalities, there still has been increase in materials residents are hauling to the curb every week.

Based on the 12 Ontario municipalities surveyed, front line waste management workers have been collecting on average four percent more residential garbage, 12 percent more residential green bin materials while the amount of Blue Box materials have remained relatively static.

Not every municipality is being impacted in the same way. For some waste generation has remained relatively static, potentially the result of people migrating out of these communities given the closure of universities, colleges and certain businesses. For others there have been much greater waste generation rates (e.g., upwards of 15 percent increases in garbage and 20 percent for green bin materials).

Although data has been more difficult to acquire on commercial waste, preliminary data received indicates that overall commercial waste is down. Restaurants appear down in excess of 70 percent, and manufacturing appear down by roughly 15 percent.

# Environmental Engineers .....

develop **solutions** to protect the environment from human activity.

Prevent - Mitigate - Clean-up/restore

# Water Resources Engineers .....

develop **solutions** to understand, plan  
and protect watersheds and water  
systems.



# Potential Careers

- **Consulting**
  - Jacobs, RWDI, GHD, Burnside all have a large number of our graduates
- **Environmental Technology Development**
  - Suez Water Technologies & Solutions
- **Small to Big Enterprises**
- **Government**
  - Environment Canada, Natural Resources Canada, Ontario Ministry of the Environment, Conservation Authorities, Municipalities
- **Lawyers**
- **Teachers**
- **Graduate School**
  - Engineering (Guelph, Toronto, Waterloo, Queen's, Ottawa, ...)
  - MBA ... many after working for a period of time
- **Faculty Members** (Western, U of A, Daltech)

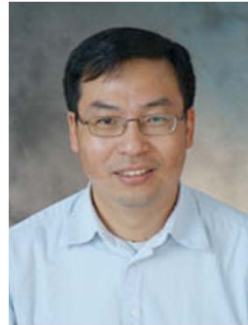
# Environmental Faculty



Dr. Bill Van Heyst



Dr. Amir Aliabadi



Dr. Hongde Zhou



Dr. Sheng Chang



Dr. Emily Chiang



Dr. Cameron Farrow



Dr. William Lubitz



Dr. Bassim Abassi



Dr. Rafael Santos



Dr. Erica Pensini



Dr. Richard Zytner

# Water Faculty



Dr. Andrew Binns



Dr. Prasad Daggupati



Dr. Bahram Gharabaghi



Dr. Jana Levison



Dr. Ed McBean



Dr. Ramesh Rudra



Dr. Andrea Bradford



Dr. John Donald



Dr. Beth Parker

# Water / Environmental Staff



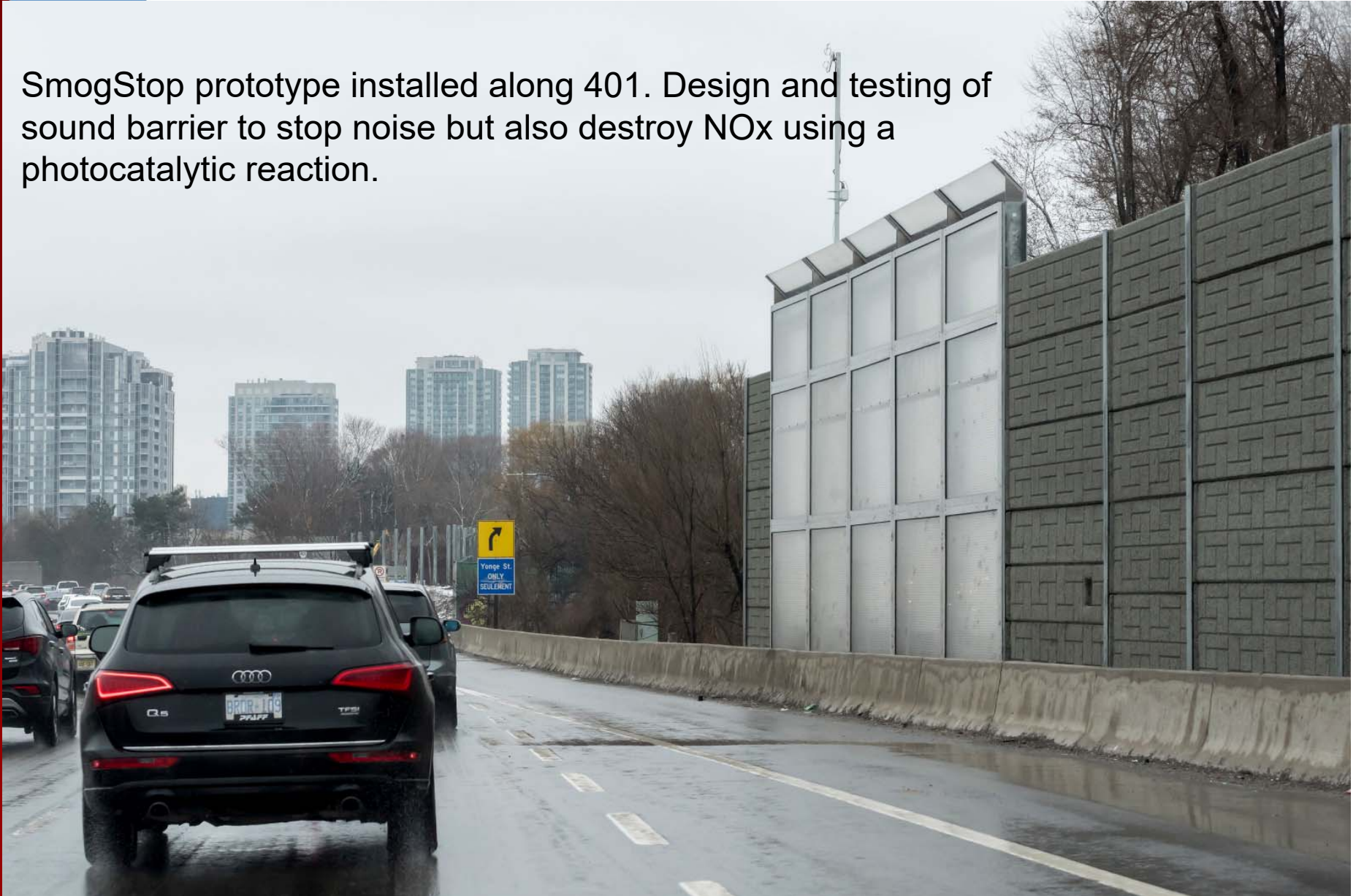
Joanne Ryks



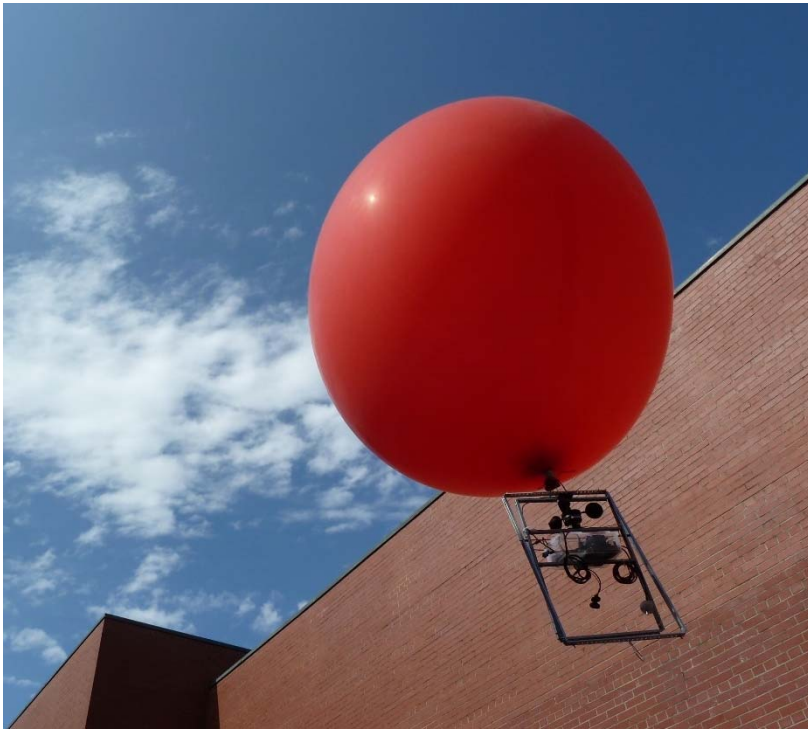
Ryan Smith

# Air Pollution Research

SmogStop prototype installed along 401. Design and testing of sound barrier to stop noise but also destroy NO<sub>x</sub> using a photocatalytic reaction.



# Microclimate and Air Pollution Research



[https://youtube/Ddfal\\_d6IMk](https://youtube/Ddfal_d6IMk)



Tethered And Navigated Air Blimp (TANAB)  
System Used to Study the Atmosphere for Microclimate and Air Pollution Research

- Tertiary treatment for the removal of nutrients
  - Pilot scale research program



Pilot Scale Membrane-based Wastewater Treatment System

Operating at the City of Guelph's wastewater treatment plant

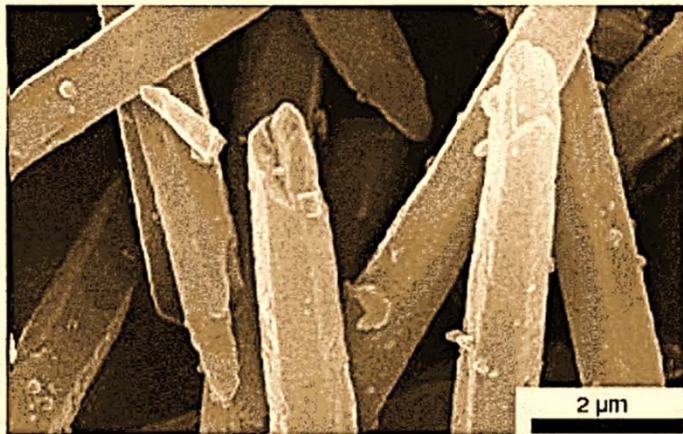
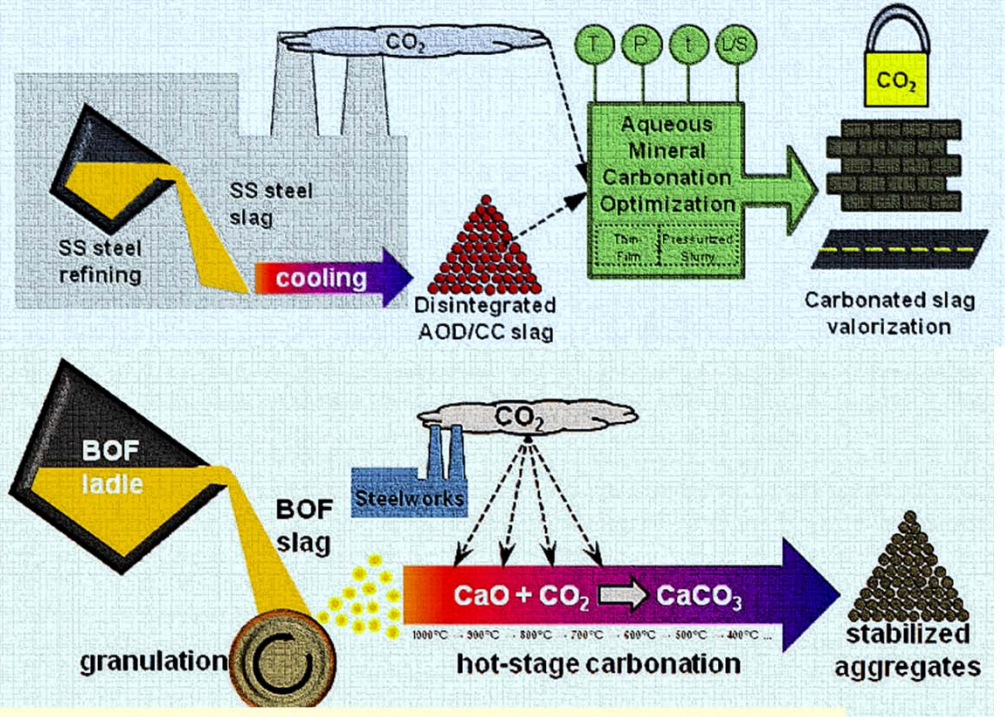
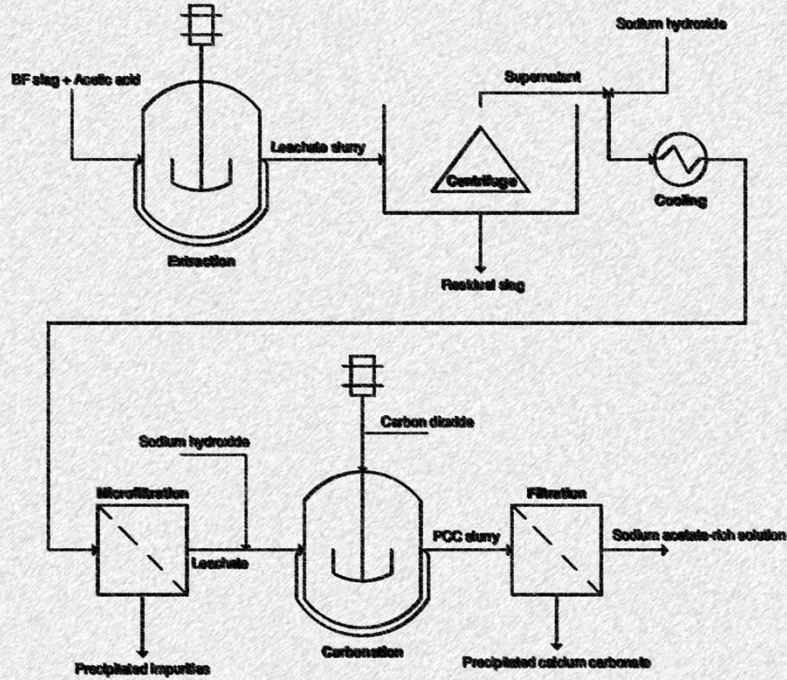
# Renewable Energy

- Wind energy
  - Wind resource assessment
  - Small turbine design
- Microhydro
  - Hydro turbine design and modeling
  - datalogging
- Wind engineering
  - Wind tunnel simulation
  - Wind loading



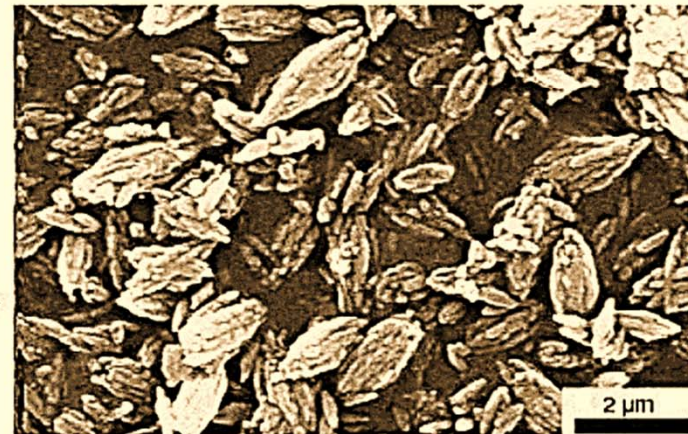


# Materials Recovery



Mechanical mixing, 70 °C , > 99% aragonite

+ US  
↓ T  
Optim.  
→



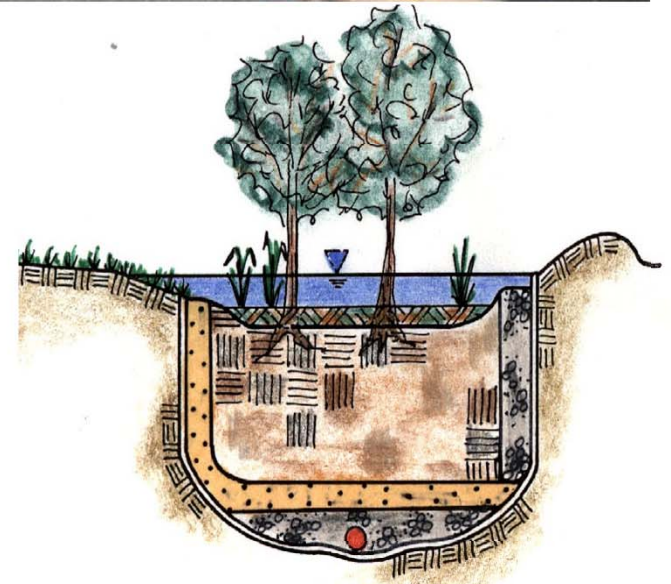
Ultrasound mixing, 24 °C, > 98% aragonite

# Soil Vapour Extraction (SVE)

- About 25% of all gasoline stations are contaminated
- Many dry cleaners have contaminated sites (TCE, PCE)
- SVE is widely used, our research
  - Lab & field work
  - to reduce costs, to improve performance and to aid system design



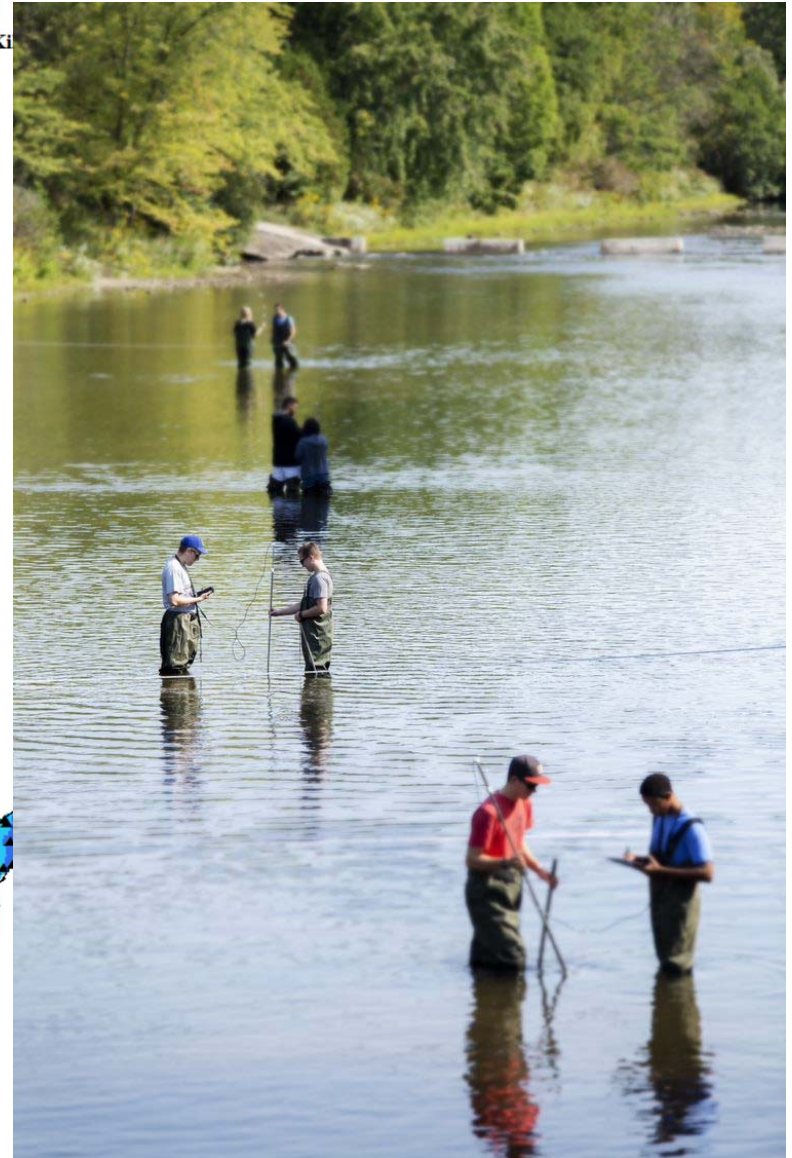
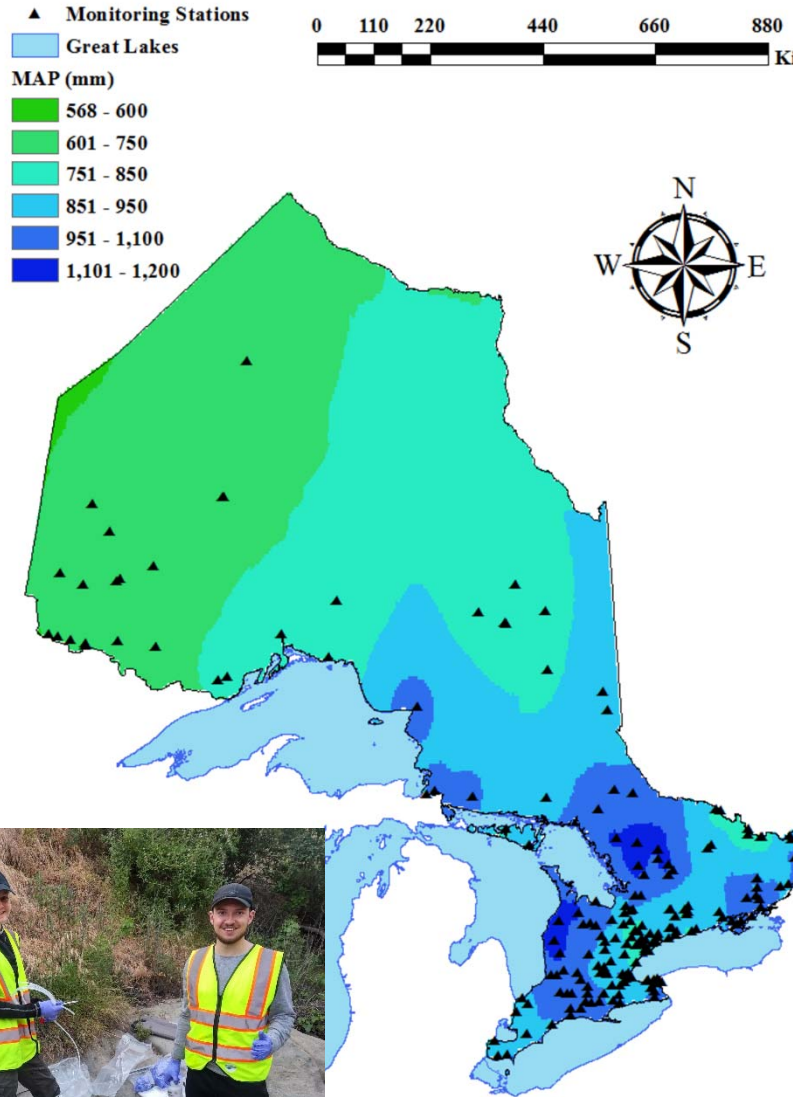
# Rainwater Management



# Groundwater



# Surface Water



# An Environmental or Water Resources Engineering education ...

provides you with the **competencies**  
(**knowledge, skills, ...**) to develop solutions  
to global environmental and water  
resources challenges

- An interdisciplinary program that links water, air, soil and energy
  - Offers multi-disciplinary perspectives - Civil, Chemical, Mechanical
  - Preventative solutions as well as assessment and treatment
    - Unique programs – built from the ground up
    - Design is central
- An unique program focused on human and natural water systems
  - Water science combined with practical engineering skills
  - Prevention and planning, plus problem-solving and remediation

# EE Courses

**Core:** Engineering Design, Fluid Mechanics, Thermodynamics, Heat and Mass Transfer, Economics ...

## Environmental Engineering Foundational Courses

- Environmental Engineering Systems
- Mass Transfer Operations
- Air Quality
- Water Quality
- Hydrology
- Groundwater
- Soil Mechanics

## Environmental Engineering Application Courses

- Urban Water Systems Design
- Solid & hazardous waste management
- Physical and Chemical W/WW Treatment Design
- Biological Wastewater Treatment Design
- Control of Atmospheric Particulates
- Atmospheric Emission Control: Combustion Systems
- Risk Management
- Life Cycle Assessment
- Site Remediation
- Geographic Information Systems
- Energy Resources and Technologies



# WRE Courses

**Core:** Engineering Design, Fluid Mechanics, Thermodynamics, Heat and Mass Transfer, Economics ...

## **Water Resources Engineering Foundational Courses**

- Environmental Engineering Systems
- Water Management
- Geomorphology
- Water Quality
- Hydrology
- Groundwater
- Soil Mechanics

## **Water Resources Engineering Application Courses**

- Urban Water Systems Design
- Soil-Water Conservation Systems Design
- Physical and Chemical W/WW Treatment Design
- Biological Wastewater Treatment Design
- Site Remediation
- Risk Management
- Geographic Information Systems
- Ecology
- Fluvial Processes
- Remote Sensing
- Life Cycle Assessment

# Capstone Design Projects

- Design of a Landfill Bioreactor (Wellington County)
- Sustainable Infrastructure: Water, Energy & Waste Systems for a Rural Health Centre in Lesotho, Africa
- Potable Water System for a Village in Bangladesh
- Remediation of Water Quality, Copper Cliff Creek (Sudbury)
- Energy Efficiency at the Guelph Wastewater Treatment Plant
- Particulate Matter Removal from On-Road Diesel Engines
- Soil Remediation of Petroleum Hydrocarbons in Northwest Territories
- Canadian First Nations – Water Purification Plan

**Posters are displayed throughout the Engineering Complex ... watch for them once you're here in person...**

- WEAO (Water Environment Association of Ontario) Student Design Competition
  - 1<sup>st</sup> in 2017, 2016, 2013, 2011
- Canadian and Ontario Engineering Competitions
- Canadian Engineering Memorial Foundation Winners
- Junior fellows of Engineers Without Borders, travelling to Malawi, Ghana and Zambia



41x Team Won **WEAO**  
Student Design Competition

# Guelph Engineering

Questions?