The Flint Water Crisis
Ut Prosim in Action

The Flint Water Study Team
Siddhartha Roy

www.flintwaterstudy.org
Grateful acknowledgement

- National Science Foundation, #1556258
- **Citizens of Flint**
  - WaterYouFightingFor? (Melissa Mays and LeeAnne Walters)
  - Hurley Medical Center (Mona Hanna-Attisha and others)
- US EPA Region 5 (Miguel Del Toral, Mike Schock, Darren Lytle)
- ACLU - Michigan (Curt Guyette, Kate Levy)
- Sen. Jim Ananich, Congressman Dan Kildee (and their extraordinary staff)
- 1500+ donors supporting our work
- MI DHHS / Genesee Co. Health Dept
- Democracy Defense League (Nayyirah Shariff, Claire McClinton)
- Dr. Laura Sullivan
- Northeast-Midwest Institute (Elin Betanzo)
- Concerned Pastors for Social Action (Pastors Harris and Overton)
- Parents for Non-toxic Alternatives (Dr. Yanna Lambrinidou)
- City of Flint (Mayor Karen Weaver, Dayne Walling, Howard Croft, Mike Glasgow)
- Members of the media
- **Virginia Tech (staff and students)**

[Image of people and logos]
Undergrads: Madeleine Brouse, Margaret Carolan, Sara Chergaoui, Matthew Dowdle, Kim Hughes, Rebecca Jones, Philip Smith, Alison Vick
Research Scientists: Brandi Clark, Dongjuan Dai, Sheldon Masters, Jeffrey Parks, Kelsey Pieper, David “Otto” Schwake, Fei Wang
Staff: Cassandra Hockman
Principal Investigators: Dr. Marc Edwards, Dr. Amy Pruden, Dr. Joseph Falkingham III
“Lead makes the mind give way”
– Discorides, 2nd Century BCE
the prolific installation of lead pipes across the U.S.: “a long-running environmental and public health catastrophe”
No Lead

Lead Pipe

Lead In Brass

Lead Solder

Graphic Adapted from: http://www.clevelandwater.com/customer-service/protect-your-home/home-tips
April 2014
Switch to Flint River

October 2014
General Motors stops using Flint Water

January 2015
Exceeds total trihalomethane limit

August - September 2014
Bacteria/E. coli violation

General Motors shutting off Flint River water at engine plant over corrosion worries
No Corrosion Control

Michigan Department of Environmental Quality (MDEQ) Responsibility

+ Corrosive Water

Due to Flint River water chemistry

= Perfect Storm For Lead Release
“Flint water is safe to drink.”
“A major concern from a public health standpoint is the absence of corrosion control treatment in the City of Flint”
August 13, 2015

300 kits
90% return rate
Website/Facebook/Twitter launched late August

Purpose:
• Inform Flint residents about water quality issues
• Bring public awareness w/ data and science
• Resident queries framing research questions

www.flintwaterstudy.org
At a Flint hospital
Physical/Chemical Parameters Measured |

Temperature
Dissolved Oxygen
Chlorine residual
THMs (Disinfection by-products)

Technology Used

qPCR
ICP - MS

Biological Parameters Measured

Legionella pneumophila
Legionella spp.
Total Bacteria (16S)
Mycobacterium avium
Mycobacterium spp.
Acanthamoeba polyphaga
Pseudomonas aeruginosa
Heterotrophic Bacteria
Acid Producing Bacteria
Iron Reducing Bacteria
Sulfate Reducing Bacteria
Slime Forming Bacteria
Denitrifying Bacteria
Staphylococcus

BART Technology Used

Probes
Chlorimeter
THMFP
Culture
Public Health Advisory: September 2015

For 269 HOMES:

90%ile for First Draw = 26.8 ppb  
EPA Action Level = 15 ppb

Highest First Draw: 158 ppb  
Highest overall: 1051 ppb
Anurag’s story --
A Compassionate Call to Help!

SafeWater4Flint

$4,345 of $25k
Raised by 68 people in 25 days

Donate Now
Response from MDEQ

“This group specializes in looking for high lead problems. They **pull the rabbit out of that hat** everywhere they go. Nobody should be surprised when the rabbit comes out of the hat, even if they can’t figure out how it is done”

-Brad Wurfel

*MDEQ’s Communications Director*
Lead Corrosion Experiment

Flint vs. Detroit

- Flint River: 19x higher lead concentration
- Detroit: Lower lead concentration
Lead Corrosion Experiment

Ms. Weiss’ class at City School, Grand Blanc, MI

Flint water was always MORE corrosive than Detroit water.
Drew: “…Flint water is DISGUSTING!”

Ridley: “Flint = SNOW GLOBE”

Sophia: “…the Flint water looks bad and unhealthy to drink…”

Drew: “…Flint looks like a snow globe and Detroit looks like nothing barely happened” -Caroline

Ridley: “Flint = SNOW GLOBE”
Iron Corrosion Experiments
Detroit Water

Flint Water

9X more Fe release
Elevated lead found in more Flint kids after water switch, study finds

Dr. Mona Hanna-Attisha, Director of Pediatric Residency at Hurley Children's Hospital, speaks to more than 60 that gather as doctors call for a public health advisory in relation to Flint's water woes, urging city residents in high risk groups -- which include infants on...
State regulators quickly responded. Brad Wurfel, spokesman at the Department of Environmental Quality, said the water controversy is becoming "near-hysteria."

"I wouldn't call them irresponsible. I would call them unfortunate," Wurfel said of the doctors' comments.

"Flint's drinking water is safe in that it's meeting state and federal standards," he said. "The system has an aging portion that needs to be addressed. They haven't had meaningful maintenance for four decades or more."
Detroit water begins flowing into Flint once again

Flint Mayor Dayne Walling announces an official switch back to Detroit water during a news conference on Friday, Oct. 16, 2015, outside Freeman Elementary School in Flint, Mich. The Detroit water will be flowing through Flint pipes as soon as 5 p.m. on Oct. 16th.
Legionnaires’ Outbreaks
~ 90 cases; 12 deaths
“I KNOW IF I WAS A PARENT UP THERE [IN FLINT], I WOULD BE BESIDE MYSELF IF MY KIDS’ HEALTH COULD BE AT RISK.”

- President Barack Obama, after declaring a federal emergency
18 months
100,000 residents
9000 kids exposed
200 confirmed cases
12 deaths
Legionnaire’s Disease
100s of main breaks
Water > $150/month
THE GOVERNMENT AND THE WATER INDUSTRY BETRAYED FLINT, MICHIGAN

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<th>Actors</th>
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<tr>
<td>MDEQ</td>
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<tr>
<td>EPA</td>
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<td>Emergency Managers</td>
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<td>MI Gov/City of Flint/MI Health Dept.</td>
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MDEQ/City of Flint **Cheated** on Lead Monitoring

**ACTUALLY FAILED**

W/ 71 SAMPLES

**NOW PASSED!**

W/ 69 SAMPLES
According to Walters, [MI Nurse] stated that “He is barely lead poisoned. If CDC had not changed their lead poisoning standard from 10 down to 5, we would not be having this conversation.”

Angry, Walters protested that [MI Nurse] was minimizing the problem, at which point [MI Nurse] cut her off and said “I am working with kids in their 40’s and 50’s. It is just a few IQ points...it is not the end of the world.”
To hold paramount the safety, health, and welfare of the public – VT (First Canon of Civil Engineering)

I’m not so sure Flint is the community we want to go out on a limb for.

- Internal EPA Email

The ‘Ut Prosim’ perspective

v/s
Dear Governor,

I am so mad what happen in Flint. It is bad for kids. They don't have clean water to drink for almost two years. I hope you fix this problem.

Thank you.
Help to Flint

• $600+ million in relief
  • Bottled water, lead filters, blood testing, Water Bills
  • Health, Nutrition, Education Services
  • Lead Pipe Replacement

• EPA, MDEQ, VT – Best scientists (and students!) on the ground to improve water quality

• Three Congressional Hearings and 400+ lawsuits

• 13 Michigan and Flint civil servants criminally indicted
YOU WANT OUR TRUST ???
WE WANT VA Tech !!!
VT PSI WW
Spring Break

DON’T DRINK THE WATER

The water test done by Virginia Tech indicates a high level of lead.
Water Heater Study- Summer 2015

- Initial testing did not find *Legionella pneumophila* in small buildings, even in August 2015.
- This summer will intensively monitor for *Legionella pneumophila* in electric and gas water heaters.
- Work with State of MI to study water heaters, and see if routine flushing improves water coming from
  - Increased Chlorine
  - Decreased Chlorine

Summer Vacation
More than 5,300 U.S. water systems violated lead-testing rules last year

Schools around the country find lead in water, with no easy answers

$100m loan program aims to replace Mass. lead water lines

City Failed to Test for Lead in Water at Day Care Centers,
# Lead-in-water testing in our lab (2016)

<table>
<thead>
<tr>
<th>Cities</th>
<th>Public Schools near</th>
<th>Private Wells</th>
<th>Corrosion Testing</th>
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<tr>
<td>Philadelphia, PA w/ Philly citizens</td>
<td>UNC Wilmington, NC</td>
<td>North Carolina State (3 counties)</td>
<td>Indianapolis, IN</td>
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<td>Pittsburgh, PA</td>
<td>Tuskegee College, AL</td>
<td>Orleans, NY</td>
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<td>New Orleans w/ LSU</td>
<td>Atlanta College, GA</td>
<td>Virginia State</td>
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<td>Flint, MI</td>
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<td>Buffalo, NY</td>
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<td>Dayton, OH (hospitals)</td>
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## Media Investigations
- NBC News (Milwaukee, New Orleans)
- HBO
- ABC13 (Roanoke, VA)
National Lead Testing

w/ Healthy Babies Bright Futures
"Ut Prosim in its finest spirit."

"Thank you for your heroism."

"Thank you for your integrity and for acting on your moral convictions!"

"a credit to this country."

"The world would likely not have known if not for you."

"It is people like you who restore faith in humanity!"

"an inspiration to a rising generation of scientists and engineers [...] around the world!"

"Hokie Proud!"

"SCIENCE!"
“Servant Leadership”

• VT – a unique & special place – “Ut Prosim” in our DNA
  • Service and Heroism prerequisites to doing meaningful work incl. good science
• Driven by ethics & focused on those you serve and lead
• Increased sensitivity towards injustices – social, environmental, institutional
• Never be a bystander to wrongdoing
“We must always take sides. Neutrality helps the oppressor, never the victim. Silence encourages the tormentor, never the tormented.”

– Elie Wiesel (Holocaust Survivor/Nobel laureate)