



WAYNE STATE  
UNIVERSITY

# Partnerships for Environmental Public Health Network Meeting

Climate Change and Environmental Justice:  
Engaging Diverse Teams



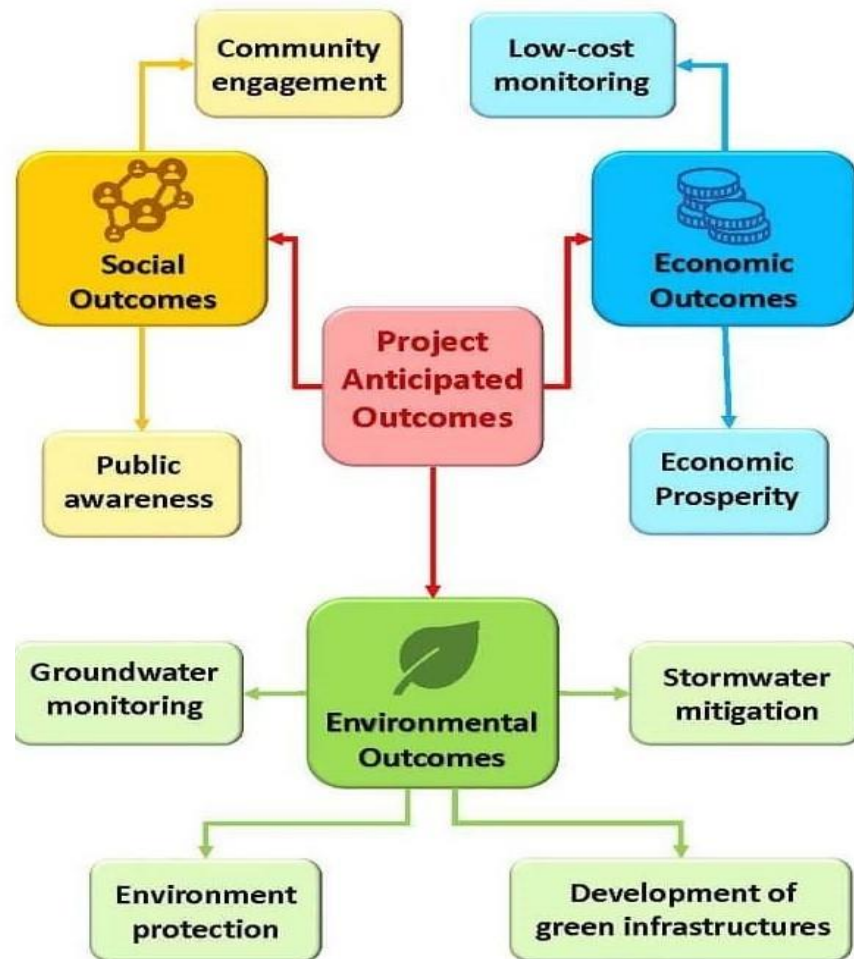
## Establishing Multidisciplinary Teams with Undergraduate and Graduate students for Translating Environmental Public Health Research

Rahul Mitra, PhD

*Wayne State University (WSU) rests on Waawiyaataanong, also referred to as Detroit, the ancestral and contemporary homeland of the Three Fires Confederacy. These sovereign lands were granted by the Ojibwe, Odawa, Potawatomi, and Wyandot nations, in 1807, through the Treaty of Detroit. WSU affirms Indigenous sovereignty and honors all tribes with a connection to Detroit. With our Native neighbors, WSU can advance educational equity and promote a better future for the earth and all people.*



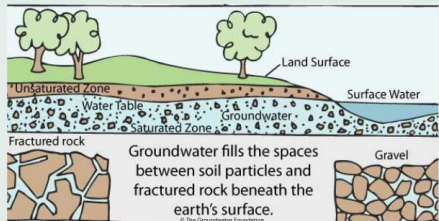
## Project 1 - Green stormwater infrastructure Informed Urban Groundwater Monitoring Networks





# GROUNDWATER: WATER YOU DRINK!

## GROUNDWATER



## TOP WAYS GROUNDWATER IS POLLUTED



**SUBSURFACE CONTAMINATION**

**ATMOSPHERIC CONTAMINATION**

**SURFACE CONTAMINATION**

**LANDFILLS AND WASTE DISPOSAL**

## HEALTH RISKS OF POLLUTED GROUNDWATER

Headaches, Cancer, Destroys Nervous System, Thyroid, Reproductive, Liver & Kidney Damage, Breathing Issues

## HOW YOU CAN PROTECT OUR GROUNDWATER!

**CLEAN UP AFTER YOUR  
DOG.**



**REDUCE CHEMICAL USE  
LIKE LAWN SPRAYS.**



**REDUCE. REUSE.  
RECYCLE.**



**DON'T LET YOUR SINK  
WATER RUN.**



## What is a Water Budget?

understanding  
urban water management

a water budget is an accounting of the rates of water movement and the change in water storage in all or parts of the atmosphere, land surface, and subsurface

### What are the basics?

- water budget methods work as a design tool, enabling professionals to create a sustainable landscape based on a quantity of water

- water budgets are reliant/influenced by the hydrologic cycle



### Importance of budgeting

- provides information that helps determine how to best control irrigation
- promotes water conservation
- reduces energy costs of treating and pumping water

### What is the Hydrologic (Water Cycle)?

- precipitation reaches the earth's surface, ultimately to evaporate back into the atmosphere
- depending on where the precipitation accumulates (rivers, groundwater, etc...) the water can be stored for varying periods of time

### Examples of Water Budget Goals in Michigan



- ensure clean and safe drinking water for all michiganers
- achieve a 40% reduction of phosphorus inputs to the western lake erie basin - as stated by the epa
- prevent introductions and control established populations of aquatic invasive species

### "The Formula"

the water budget equation commonly is used to estimate rates of evapotranspiration or ground-water recharge

$$ET_o \times 0.62 \times [(ETAF \times LA) + (1 - ETAF) \times SLA]$$

- 0.62 is a conversion factor (from inches/year to gallons/year)

### Calculation uncertainty

- all water budget calculations contain some uncertainty or unpredictability
- there are two general sources of this uncertainty: natural variation in the hydrologic cycle and measurement errors
- urbanization can also add uncertainty - changes models



## COMBINED SEWER OVERFLOW/SYSTEMS

(CSOs & CSSs)

CSOs are the result of sewer systems that drain both stormwater runoff, and human industrial waste. Eighty municipalities in Michigan, and many in the Detroit area, have such systems, known as **combined sewer systems**

### DID YOU KNOW?

FROM JANUARY 2018 TO MAY 2020 6.7 BILLION GALLONS OF MICHIGAN WATER HAS BEEN CONTAMINATED AS A RESULT OF COMBINED SEWER OVERFLOWS



### WEATHER EFFECTS

During heavy rain events, CSSs can be overwhelmed, and a mix of stormwater and raw or partially treated sewage spills into waterways



The Rouge and Detroit rivers are in danger of becoming more polluted as a result of this combination of wastewater from homes + businesses mixing with stormwater



These sewer pipes don't only carry wastewater from toilets, showers, and drains... They also carry stormwater when there is wet weather

Most of the time, combined sewer systems send everything to its local wastewater treatment plant

### MANAGEMENT

- The Great Lakes Water Authority (GLWA) is responsible for managing facilities and programs to prevent untreated CSOs
- GSI (Green Stormwater Infrastructure) is an innovative approach to treating stormwater where it falls
- By using native plants and natural processes as filters for stormwater, GSI slows the flow of water into a city's sewer system

In southeast Michigan, approximately THREE MILLION residents and THOUSANDS of businesses send wastewater down their drains each day to a network of sewer pipes that lead to the Detroit Water Resource Recovery Facility

From January - April 2014, RTBs prevented more than 7.5 BILLION gallons of untreated combined sewage from overflowing into our waterways

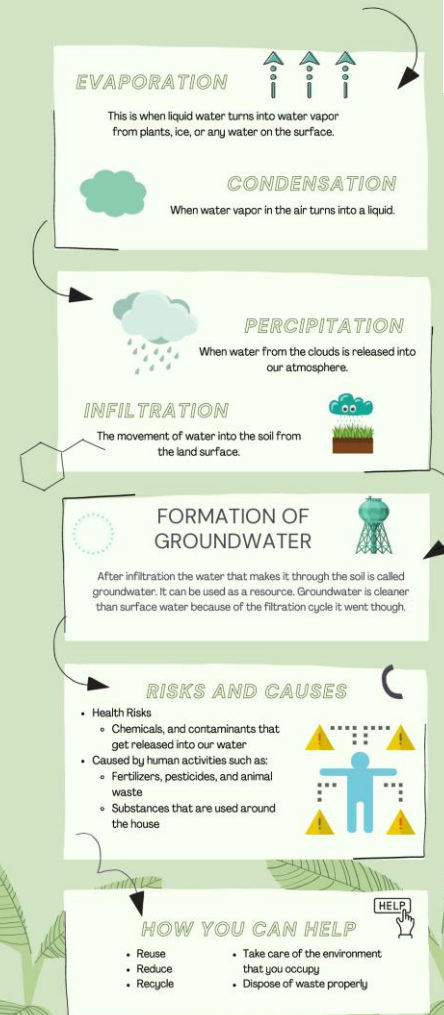


SCAN QR CODES FOR MORE  
INFORMATION



## GROUNDWATER

DID YOU KNOW WATER FLOWS THROUGH THE ENVIRONMENT IN A CONTINUOUS CYCLE?





## Project 2 - Human Exposure Routes and Health Risks from Volatile Organic Compounds (VOCs) in Urban Areas



**Project 1** • Field Study



**Project 2** • Sensing/Remediation Study



**Project 3** • Zebrafish Model



**Project 4** • Placental Mammal Model



**Project 5** • Human Population Study







## Project 2 - Human Exposure Routes and Health Risks from Volatile Organic Compounds (VOCs) in Urban Areas





## Takeaways for Meaningful Partnership

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1. Identify goals and audience for partnership products
2. Start conversations early with instructors to be clear about expectations and timelines
3. Project Liaison should be clear and responsive in communication with student teams
4. Co-negotiate use of platforms and tools that undergraduate students can access
5. Root the products in rigorous theory and research
6. Ensure the products are Informed by community needs and concerns
7. Schedule adequate opportunities for feedback and revision
8. Plan clear strategy for distribution of products; ***what's next?***
9. **Have fun!** 😊





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CLEAR

Center for Leadership  
in Environmental Awareness  
and Research

Thank you 😊

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