GHOSH LAB OVERVIEW

https://ghoshlab.umbc.edu

Dr. Upal Ghosh,
Professor

UMBC

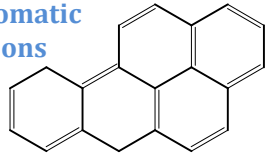
Chemical
Biochemical and
Environmental
Engineering

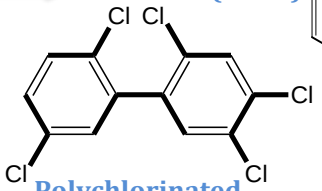
GENERAL AREAS OF WORK

Environmental Engineering & Science

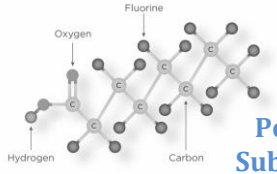
FATE AND TRANSPORT | EFFECT | REMEDIATION

Polycyclic Aromatic Hydrocarbons (PAHs)

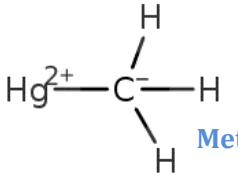




Polychlorinated Biphenyls (PCBs)



Polyfluoroalkyl Substances (PFAS)



Methylmercury (MeHg)

H O C

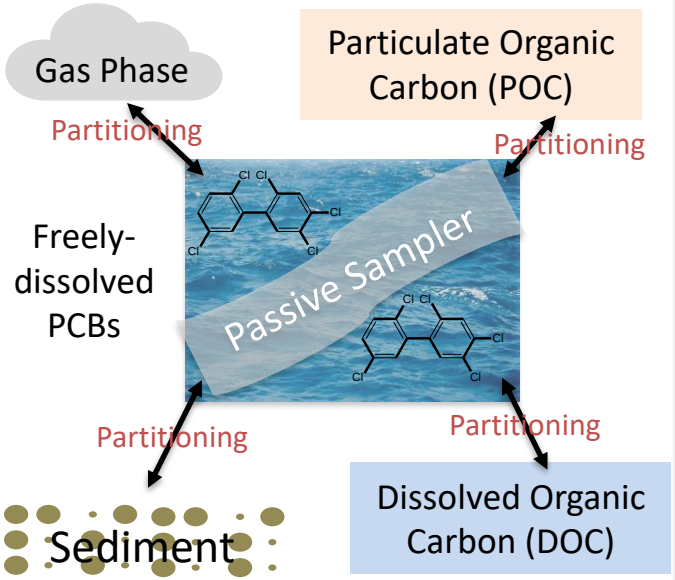
Areas of Work:

Quantification of HOCs in the environment using **Passive Sampling**.
Enhancement/Optimization of Passive Sampling Methods.

Assessment of **pollutant fate** and **bioavailability**

Development, Demonstration, and Transition of novel **remediation technologies** for polluted sediment

PASSIVE SAMPLING METHODS



Data Collection/Field Work

Sample Processing

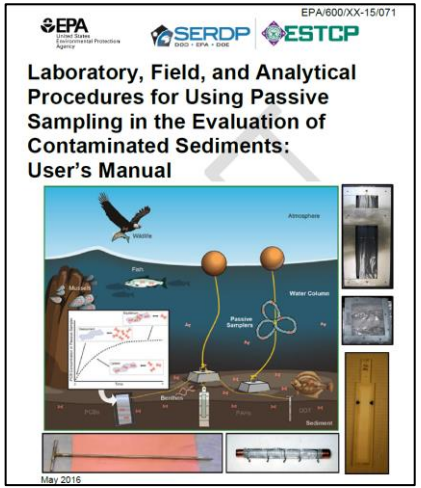
GC-ECD

GC-MS with high efficiency source

GC-MS Triple Quad

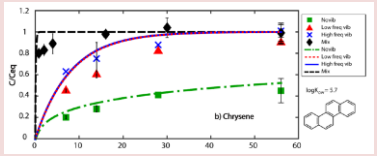
ONGOING PROJECTS

NEW GUIDANCES & STANDARD METHODS



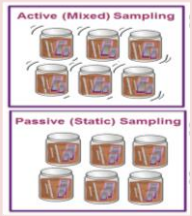
Ghosh et al., 2014

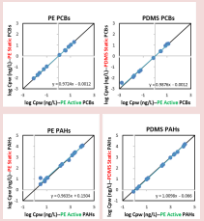
Actively shaken in situ passive sampler platform for methylmercury and organics.



SERDP DOD • EPA • DOE

Standardization of Polymeric Sampling for Measuring Freely Dissolved Organic Contaminant Concentrations in Sediment Porewater.



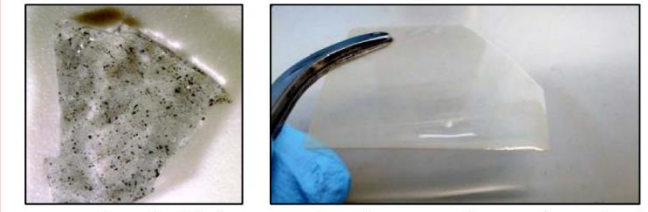


SERDP DOD • EPA • DOE

ESTCP

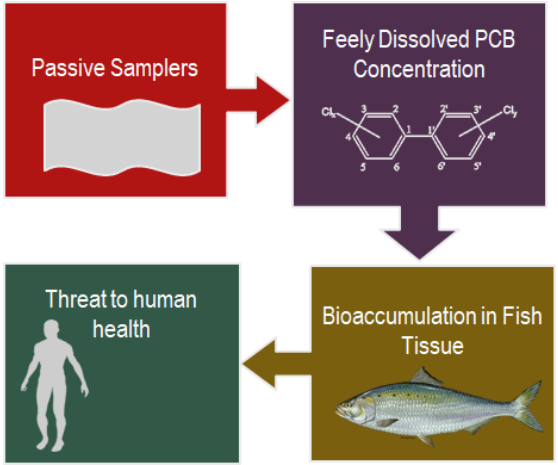
EPA United States Environmental Protection Agency

Development of novel functionalized polymeric thin films for equilibrium passive sampling of PCBs, PAHs, MeHg, PFAS compounds in surface and groundwater.

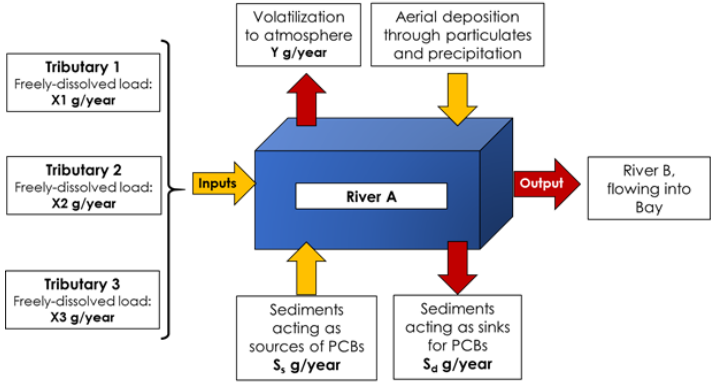


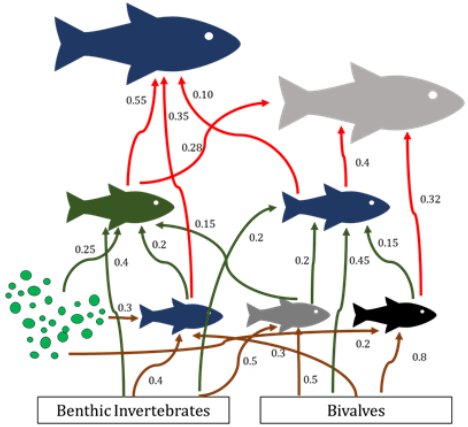
SERDP DOD • EPA • DOE

POLLUTANT FATE AND BIOAVAILABILITY



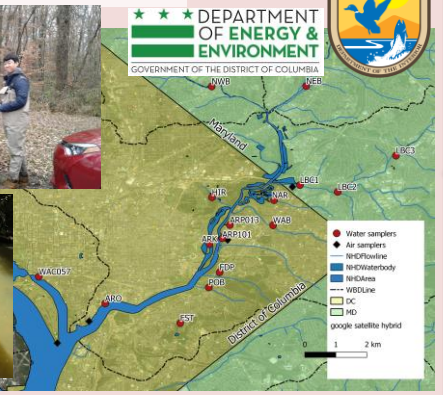
- Human exposure from water through food chain
- **Dissolved concentrations control exposure**
- Contributions to water from:
  1) Bed sediments
  2) Inputs from tributaries and outfalls
  3) Air-water exchange



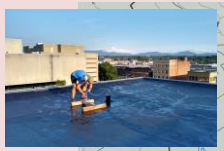


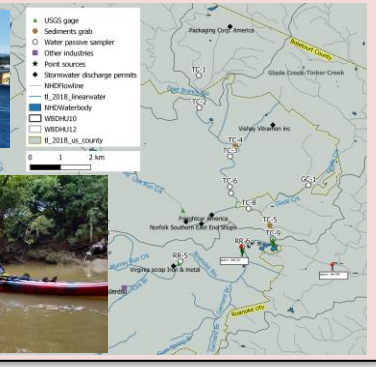
ONGOING PROJECTS

Anacostia River, DC



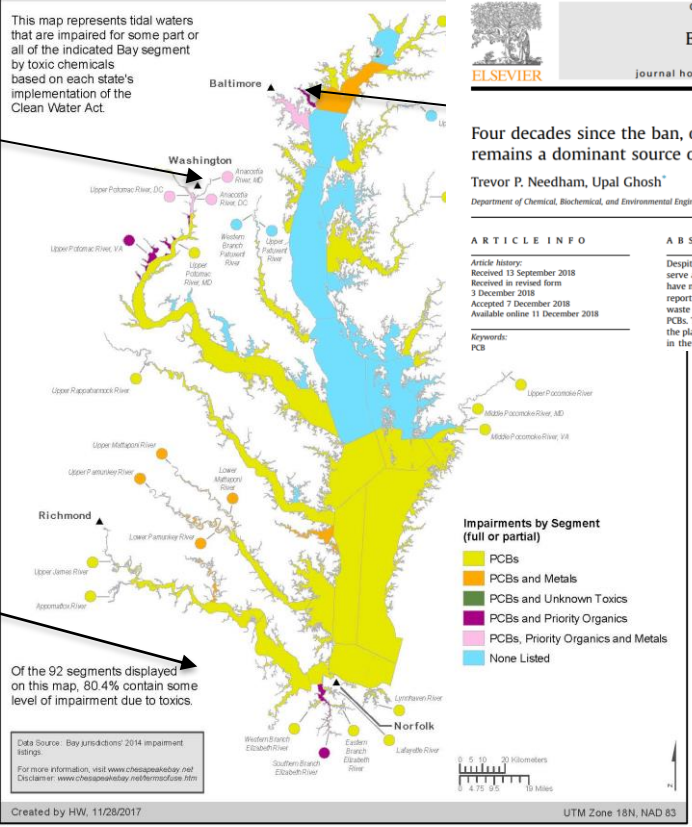
Roanoke River, VA

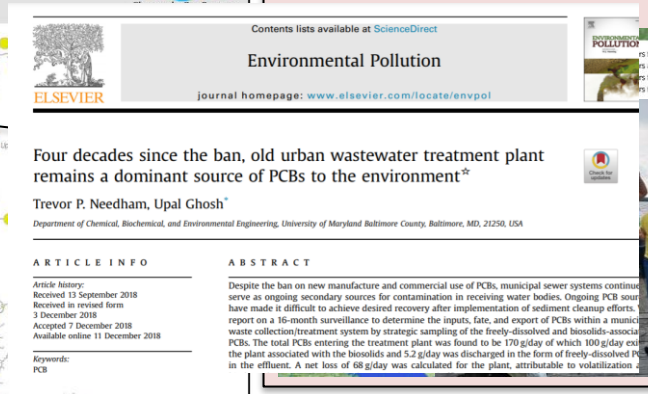




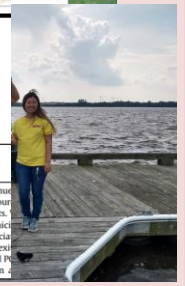
Chemical Contaminants (2014)

Impairments Illustrated Using the Chesapeake Bay Segmentation Scheme



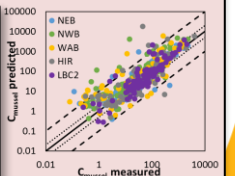


Back River, Baltimore, MD



Monitoring PCB levels in fish in MD.

Maryland Department of the Environment



REMEDIATION: Development, demonstration and transition of novel technologies

TECHNOLOGY TRANSITION (Scale up through EPA-SBIR, NIEHS, DoD)

Microbial amendments for in-situ treatment of Christina River, Delaware.

PUBLICATIONS IN LEADING JOURNALS

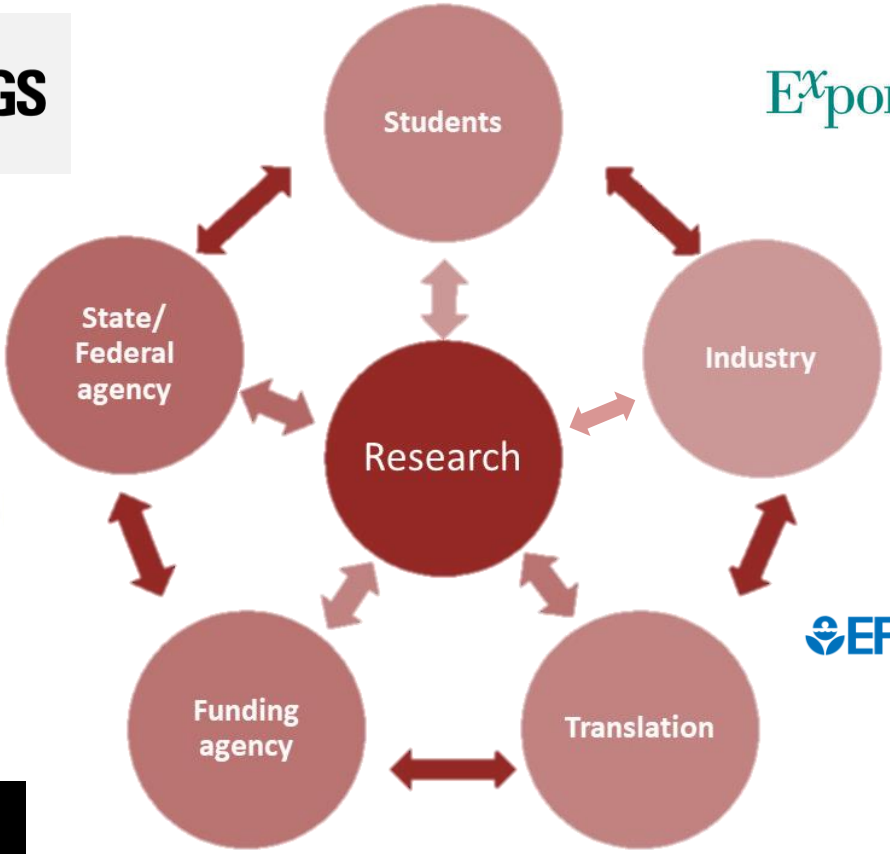
COLLABORATING WITH STATE AND FEDERAL AGENCIES

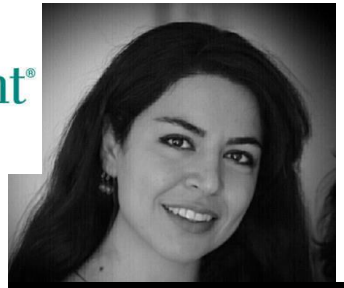
- ❑ Maryland Department of Environment (MDE)
- ❑ Delaware Department of Natural Resources and Environmental Control (DNREC)
- ❑ DC Department of Energy and Environment (DOEE)
- ❑ US Geological Survey (USGS)
- ❑ US Fish and Wildlife Service (USFWS)
- ❑ Baltimore Port Administration

RESEARCH, TRAINING, AND TRANSLATION "ECOSYSTEM"

Trevor Needham
Hydrologist

Hilda Fadaei
Environmental Engineer





Mehregan Jalalizadeh
Senior Associate

James Sanders

UMBC

THANK YOU