



Canaan Valley Institute

WORKING FOR THE SUSTAINABILITY OF THE MID-ATLANTIC HIGHLANDS SINCE 1995

PO Box 673
Davis, WV 26260
1-800-922-3601
www.canaanvi.org



Mercury Monitoring in the Mid-Atlantic Highlands

Canaan Valley Institute's Mission

Canaan Valley Institute (CVI) is a nonprofit, non-advocacy organization formed in 1995 to help communities address and solve serious water quality issues. CVI scientists have collaborated with a number of partners to conduct integrated and long-term scientific research on emerging issues. CVI strives to provide stakeholders in the Mid-Atlantic Highlands with the information they need to identify and prioritize watershed restoration needs.

Past and Current Collaborative Mercury Research

The mercury monitoring site at Canaan Valley, operating since 2005, is a contributing and founding station (1 of 5) to the National Atmospheric Deposition Program Consortium (NADP) National Mercury Initiative for estimating mercury (Hg) wet/dry deposition rates with continuous speciation measurements and precipitation sampling. It is the only station of its kind in West Virginia. The main purpose of this site is to monitor atmospheric Hg species, and to develop techniques to examine the fluxes of Hg species at the air-surface interface. CVI also operates Climate Reference Network, Ameriflux, Global Energy and Water Cycle Experiment (GEWEX), and AIRMoN sites in Canaan Valley.

The facilities and datasets are utilized by NOAA, EPA-sponsored researchers, and university researchers and graduate students performing environmental Hg studies. Soils and sediment were collected and analyzed by Duquesne University in July 2005. CVI plans to repeat the exercise with the addition of biota in July 2008 with researchers from the University of Maryland's Appalachian Lab. Other collaborators are Jesse Bash (EPA RTP), Steve Lindberg (EPA STAR), NOAA ARL, ORNL, West Virginia University, and Penn State. For an introductory article on CVI's collaboration with NOAA on Hg monitoring go to http://www.canaanvi.org/canaanvi_web/news.aspx?id=44.

- The Canaan Valley Institute is in the heart of the Mid-Atlantic Highlands which generates and receives some of the highest atmospheric inputs of mercury in the nation, and is the primary source of freshwater to the Chesapeake Bay.
- Twenty-two rivers and lakes within West Virginia are on the EPA 303b list of mercury impaired waters.
- CVI is a founding station of the NADP Atmospheric Mercury Initiative contributing data to the national network.
- On CVI's 3,223 acre property is an intact, forested watershed of 945 acres entirely contained within the organization's research campus.
- CVI's facilities and datasets are utilized by NOAA, EPA-sponsored researchers, and university researchers and graduate students.

CVI's Mercury Monitoring Site

CVI's monitoring site is located in the Mid-Atlantic Highlands near Davis, West Virginia. The Mid-Atlantic Highlands generates and receives some of the highest atmospheric inputs of mercury in the nation, and is the primary source of freshwater to the Chesapeake Bay. In West Virginia, twenty-two rivers and lakes are on the EPA 303b list of mercury impaired waters.

research to understand how Hg and other pollutants move through this watershed.

Determining Mercury Mass Balance

At this research watershed we are measuring the mercury inputs (wet and dry deposition), the storages (soils, sediments, snow, and vegetation), and the outputs (re-emission, stream outflow, groundwater outflow) to determine a mass balance and residency times. In the future we will add fine scale MeHg measurements in stream and wetland waters; forest, wetlands, and riparian soils; and aquatic plants, benthic herbivores/omnivores, and predators. Combined with landcover microtopography and other GIS layers, we will be able to determine where methylation is occurring and where MeHg is accumulating.

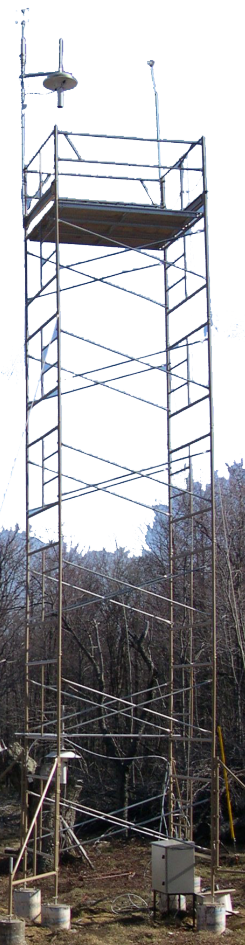
CVI Facilities for Education and Research

Located on 3,223 acres of CVI property, adjacent to Canaan Valley National Wildlife Refuge, the property lends itself to several kinds of focused research. Past and current studies on the property involve population and community ecology, environmental impacts of deer populations, wetland functional capacity and ecosystem services, and forest rehabilitation experimental enclosures. Data is available from monitoring equipment already in place on the property including continuous-recording discharge measurements on Yellow Creek and 12 water level monitors in various wetlands locations. The long-term monitoring site on the CVI property is within the 954 acre intact, forested Weimer Run watershed. The Weimer Run watershed has been fully mapped with airborne LiDAR and hyperspectral imaging.

Landcover and the biotic contents of the watershed are well documented and have been integrated onto GIS layers along with climatic and remotely sensed data. Our future plans are to combine the measured mercury balance with various GIS data layers to determine the climatic and landscape variables that control mercury fluxes, lifetimes, methylation, and bioaccumulation rates so that a mercury model developed at the Weimer Run watershed can be applied to other watersheds. CVI has already begun the process of collecting baseline data for the watershed and plans to begin

In April 2008, CVI broke ground on a 25,000 square foot research and education center. This facility is scheduled for completion in 2010, and will house a 150 seat conference room, 40 seat computer lab, research lab, student training lab, and office space. Outdoor classrooms will be available to professionals, community leaders, and students from the university level to elementary school.

In addition, The National Youth Science Foundation is constructing a youth field facility on the CVI campus to be completed in 2012.



Measurements	Frequency	Notes
Hg wet deposition	weekly	MDN with N-con collector
Hg throughfall	event	campaign
Hg speciation	hourly	Tekran 2537, 1130, 1135
RGM Flux	campaign	manual denuders with flux system
GEM Flux	every 30 minutes	2537a, dual sampling system, modified Bowen ratio
surface snow	biweekly	seasonal with Big Piney site
stream water	once per week	filtered and unfiltered, combined with steam gauge volume flow
groundwater	monthly	combined with monthly groundwater flow estimates
soils and sediments	campaign	July 2005, July 2008