KAREN A. MERRITT PhD, MPH

EDUCATION

MPH — Global & Community Health; University of Massachusetts, Amherst

Capstone | Thesis: Redesigning the Curriculum: Environmental Engineering × Public Health; Infrastructure History and Disparities in Service Provision in the United States

PhD — Environmental Engineering; University of Maine

Dissertation: Mercury Dynamics in Sulfide-Rich Sediments: Geochemical Influence on Contaminant Mobilization and Methylation within the Penobscot River Estuary, Maine

BA — Geology; Carleton College

WORK | SKILLS | EXPERIENCE

Current - 2020 **Earth Science, Mathematics & Environmental Engineering Faculty**
Maine Maritime Academy School of Ocean Studies + Arts & Sciences (2023 - current); University of Maine Dept. of Civil and Environmental Engineering (2020 - 2023); || Environmental & Public Health Engineering; Environmental and Coastal Geology; Social and Environmental Justice in STEM; Low-Cost/DIY Instrumentation

Current - 2016 **Environmental & Public Health Engineering Consultant**
Identification, spatial and temporal delineation, ecological and community health assessment and remediation strategies for chemicals in sediment, soil and surface water.

2015 - 2012 **Environmental Services Consulting | Community & Public Health Educator**
Community health | Public health outreach and education | EMT - B

2011-2007 **Environmental Engineer - ENVIRON International**
Identification, spatial and temporal delineation, ecological assessment and remediation strategies for chemicals in sediment, soil and surface water.

2007-2000 **Graduate Student | Research Assistant** - University of Maine
Department of Plant, Soil and Environmental Sciences (2000-2002);
Department of Civil and Environmental Engineering (2003-2007)

Doctoral research funded through a US EPA STAR Graduate Student Research grant.

pre-2000 **Sail Training | Marine Science Education | Field Science**

Sea Education Association (Woods Hole, MA); Maine Maritime Academy (Castine, ME); ketch Anna Kristina (Tenerife, Canary Islands); SquareSail (Bristol, UK); James Lawrence Sailmaker (Brightlingsea, UK); schooner Roseway (Gloucester, MA); schooner Ernestina (New Bedford, MA); Finnish Marine Survey (Helsinki, Finland); University of Florida Center for Wetlands (Gainesville, FL).

SELECTED ENGINEERING | PUBLIC HEALTH | SCIENCE CONSULTING EXPERIENCE

- Municipal Client - USEPA Region 1 - Review and summarization of USEPA currently proposed revisions to the Lead and Copper Rule (LCR) for municipal drinking water management, including summarization of the framework for CDC currently proposed downward revision of the Blood Lead Reference Value (BLRV) for childhood lead (Pb) exposure.
- Kalamazoo River, MI - Evaluation of system recovery potential and recovery rate for river system historically impacted by PCB discharge via copy paper recycling. Analysis has included sediment characterization; evaluation of sediment accumulation rates through radionuclide and contaminant distribution; and assessment | integration of optical and acoustical data with surface water sample collection for evaluation of temporal and spatial trends in sediment and contaminant transport.
- Industrial Production Facility, New England - Evaluation of MNR (Monitored Natural Recovery) potential for freshwater tidal marshes impacted by discharge from an adjacent industrial production facility. Chemicals of concern include a suite of divalent metals. Evaluation included review of basis for development of site sediment Media Protection Standards, sampling and analysis in support of evaluating metals biomagnification potential in site marshes and development of an adaptive management plan for an iterative 30-year MNR remedy.
- Industry Client - Southeast U.S. - Evaluation of efficacy of reactive and/or sorptive amendments for field remediation of hydrophobic contaminants and metals in soil and sediment. Evaluation included review of current scale of implementation (bench scale, field pilot, full field), study end points (porewater, surface water and/or tissue concentration), application rate limitations (acute or chronic toxicity, placement strategy), costs and study duration for confirming effectiveness.
- English-Wabigoon Rivers, ON - Characterization of mercury fate and transport from an industrial facility across ~ 100 miles of riverine and wetland landscape. Development of field sampling plans for sediment, surface water, biota including multiple trophic levels of fish, and porewater; data evaluation and reporting; integration of historical and contemporary site data for development of a conceptual site model; and non-technical data presentation for local impacted communities.
- Penobscot River, ME - Assessed fate and transport of mercury from an industrial facility across ~ 30 miles of estuary as a component of a remedial design study. Data evaluation for conceptual and numerical modeling included spatial and depth distribution of total mercury and methyl mercury in sediment; geochronology based on radionuclide distribution in sediment; transport (rate and extent) of sediment throughout the estuary including marshes; characterization of system baseline natural recovery; and evaluation of the potential for implementation of MNR as remedial strategy.
- Legacy Site - Cold War Production Facility - Participated in invited scoping exercise to evaluate remedial strategies for Cold War Site with legacy mercury contamination. Scoping exercise included evaluation of remedial strategies for mercury-impacted soil and groundwater; evaluation of mercury capture technologies for sediment; and surface water treatment to achieve regulatory compliance during future on-site building demolition and disposal activities.
- Eastport, ME - Developed field sampling plan and managed field sampling program for a Baseline Ecological Risk Assessment (BERA) focused on aquatic receptors in the vicinity of a former manufacturing facility. Chemicals of concern include PCBs and lead (Pb). Field sampling included surface water, sediment, and aquatic biota, including benthic invertebrates and multiple trophic levels of fish. The BERA employs a sediment quality triad approach to risk assessment, with lines of evidence including sediment chemistry, benthic toxicity, and benthic community structure.
- Fox River, WI - Conducted fate and transport analysis of PCBs historically discharged through copy paper production and recycling along the Fox River. Field data, hydrodynamic modeling, GIS-based visualization techniques, and facility production and discharge records were used to develop a conceptual fate and transport model that highlighted spatial patterns in discharge and deposition in the river and downstream embayment (Green Bay). Modeling outputs were used to evaluate the potential for source apportioning for remedial litigation.
- Bridgeport, CT - Developed the field sampling plan, coordinated field sampling and conducted sediment quality triad in support of a BERA. Project focused on the potential for chemical

exposure to terrestrial and aquatic receptors at a former manufacturing facility. Chemicals of concern included PCBs, PAHs, lead and mercury. Field sampling included surface water, porewater, sediment, floodplain soil, and aquatic and terrestrial biota. Employed sediment quality triad as a weight-of-evidence approach to risk assessment for benthic invertebrates.

- Gulf of Mexico - Evaluated ecological risks associated with the closure and abandonment of natural gas pipelines. Ecological risk assessment focused on the potential effects of mercury release and mercury methylation under distinct closure scenarios, and evaluated current and future risks to benthic invertebrates and multiple trophic levels of fish. Field data, speciation modeling and GIS-based extrapolation techniques were used to predict the oxidation and methylation rate of mercury in pipeline scale, elemental mercury, mineral inclusions in drilling muds; the rate and concentration of mercury release; and the dispersal rate of mercury in overlying water.
- Lago Maggiore, Italy - Assessed fate and transport of DDT and mercury from a production facility to a lake. Field sampling included recovery and processing of deep water sediment cores, and sampling of surface water, benthic invertebrates and fish. Data, including radionuclide distribution, sediment physical and chemical characteristics, the spatial/depth distribution of identified tracers, sediment transport and flow hydrodynamics, were used to reconstruct the input history of DDT and mercury to the lake. Data were used to develop a conceptual fate and transport model that highlighted the pulsed nature of chemical and sediment inputs to the bay.
- St. Clair River, Ontario - Contributed to ecological assessment consistent with the Canada-Ontario Decision-Making Framework for Assessment of Great Lakes Contaminated Sediment (COA Framework). Applied an ecosystem approach to the evaluation of mercury exposure and potential for mercury biomagnification in the food chain. Lines of evidence included evaluation of biomagnification, sediment chemistry, benthic community structure and sediment toxicity to develop a basis for sediment management decisions regarding mercury contamination.
- Gulf of Mexico - Compiled and evaluated published literature on the distribution of chemosynthetic organisms and salt dome structures on the continental shelf and slope of the Gulf of Mexico. Evaluation was a component of a larger team effort to characterize baseline ecological conditions across the shelf and slope of the northern Gulf of Mexico.
- Sediment Remediation Workshop organized by Environment Canada - Led workshop on implementation and effectiveness of monitored natural recovery and thin layer capping as remedial strategies for contaminated sediment sites, including assessment of sediment geochemistry, impacts of ancillary geochemistry on chemical cycling in sediment, risk reduction-based monitoring objectives, timelines, and targets for defining remedial success.
- Co-authored chapters for guidance document on sediment and porewater sampling techniques for the Canadian government. Chapter text included sampling methods, site checklists and standard operating procedures for each method. As published: CCME. 2016. Guidance Manual for Environmental Site Characterization in Support of Environmental and Human Health Risk Assessment. Volume 3: Suggested Operating Procedures. PN 1555; ISBN 978-1-77202-030-4.
- co-Principal Investigator (co-PI) - Department of Defense funded research entitled: Assessing Mercury and Methyl Mercury Bioavailability in Sediment Porewater using Mercury-Specific Hydrogels (2010 - 2012). Strategic Environmental Research and Development Program (SERDP).
- Developed techniques for assessing the fate and transport of industrial mercury pollution in coastal estuarine ecosystems. Research examined the potential for diagenetic transformation and methylation of mercury discharge and included geochemical speciation modeling of mercury and chemical variables (sulfate, sulfide, organic carbon, iron, alkalinity) in sediment and porewater.
- Conducted water column and sediment quality monitoring under post-Chernobyl Baltic Sea Monitoring Program. Research included aiding in the development of equipment deployment strategies, sample collection and laboratory analyses [Internship: Finnish Marine Survey]
- Implemented monitoring strategies to assess efficacy of wetlands reclamation following phosphate mining. Research experience including determination of baseline site quality, identification of key assessment endpoints, and data collection and analyses. [University of FL; Center for Wetlands]

RESEARCH PUBLICATIONS

Merritt, K and Nagy, E. 2025. Socio-Technical Understanding and Local Impacts: Developing a Community Health Assessment in Civil and Environmental Engineering Senior Capstone (University of Maine). Advances in Engineering Education. 13(4): 100 - 104.

Reash, R., L. Brown, and K. Merritt. 2015. Mercury, Selenium, and Arsenic Concentrations in Fish Collected near Coal-Fired Power Plants along the Ohio River: Spatial Relationships and Fish Consumption Risks. Integrated Environmental Assessment and Management. 11(3): 474-480.

Fuchsman P., K.S. Bell, K. Merritt, V. Magar. 2014. Monitored Natural Recovery. In: D. Reible (ed). Processes, Assessment and Remediation of Contaminated Sediment. Springer.

Merritt, K.A., J. Conder, V. Magar, V. Kirtay, B. Chadwick. 2011. A Review of Thin-Layer Placement Applications to Enhance Natural Recovery of Contaminated Sediment. Integrated Environmental Assessment and Management. 6(4): 749-760.

Merritt, K.A., Fimmen, R., Sass, B., Foote, E., Mills, M.A., Leather, J. and Magar, V. 2010. Characterization of contaminant migration potential in the vicinity of an in-place sand cap. Journal of Soils and Sediments.10: 440-450.

Merritt, K.A., J. Conder, V. Magar, V. Kirtay, B. Chadwick. 2009. Enhanced Monitored Natural Recovery (EMNR) Case Studies Review. SSC Pacific Technical Report 1983.

Merritt, K.A. and V. Magar. 2009. Thin-Layer Capping of Mercury-Contaminated Sediment: Geochemical Influence on Risk Reduction. Battelle Conference on Remediation of Contaminated Sediments.

Merritt, K.A. and Amirbahman, A. 2009. Mercury methylation dynamics in estuarine and coastal marine environments: a critical review. Earth Science Reviews. 96: 54-66.

Magar, V.S., K. Merritt, M. Henning, M. Sorensen, and R.J. Wenning. 2009. Approaches Used for Remedy Selection at Contaminated Sediment Sites: Analysis of Two Case Studies. In: Linkov, I, E Ferguson, and VS Magar (Eds), Real-Time and Deliberative Decision Making. Springer, Netherlands.

Magar, V.S., K. Merritt, R. Santiago and J. Anderson. 2008. Monitored Natural Recovery at Contaminated Sediment Sites in Canada & U.S. In: Federal Contaminated Sites National Workshop. Vancouver, B.C.

Merritt, K.A. and Amirbahman, A. 2008. Diagenetic modeling of methylmercury dynamics in estuarine sediment porewaters. Limnology and Oceanography. 53: 1064-1075.

Merritt, K.A. 2007. Penobscot River Advisory Committee. Methylmercury cycling in the Penobscot River Estuary, Maine USA.

Amirbahman, A. and K.A. Merritt. 2007. Role of sediments in mercury sequestration, release, and transformation in the lower Penobscot River, Maine, USA. Maine Sea Grant Publication.

Merritt, K.A. and Amirbahman, A. 2007. Mercury Mobilization in Estuarine Sediment Porewaters: A Diffusive Gel Time Series Study. Environmental Science and Technology. 41: 717-722.

Merritt, K.A. and Amirbahman, A. 2007. Mercury Dynamics in Sulfide-rich Sediments: Geochemical Influence on Contaminant Mobilization within the Penobscot River Estuary, Maine, USA Geochimica et Cosmochimica Acta. 71:929-941.

Merritt, K.A. and Erich, M.S. 2003. Influence of organic matter decomposition on soluble carbon and its copper-binding capacity. Journal of Environmental Quality. 32(6): 2122-31.

RESEARCH PRESENTATIONS

Merritt, K. 2026. The Environments of Technology III: States, Development, and the Politics of Visibility: Is it Possible to Survive Invisibility to Power? History of Technology Annual Conference.

Merritt, K. and Nagy, E. 2026. Socio-Technical Understanding and Local Impacts: Developing a Community Health Assessment in Civil and Environmental Engineering Capstone. American Society for Engineering Education (ASEE) Annual Conference. Charlotte, NC.

Merritt, K. and Allison, J. 2026. Development of a Rapid, Stable and Inexpensive Monitoring Technique for Porewater Sulfide in the Intertidal Zone. Maine State Sustainability and Water Conference. Augusta, Maine.

Cleveland, A., Merritt, K. Rigas, N. 2025. Pedagogical Approaches in the Overlap of Ocean Science and Marine Engineering at a U.S. (Maine) Maritime Academy. Ocean Sciences Meeting, Glasgow, Scotland.

Bowden, B., Whittaker, K., O'Malley, S., Cleveland, A., Merritt, K., Whitney, L., Ulbrich, C., Thalhauser, M., and Farr, E. 2024. Community Engagement to Understand, Protect and Restore the Bagaduce River Estuary in Hancock County, ME. Maine Rural Issues Symposium, University of Maine, Orono, ME.

Venne, L., Merritt, K., Johnston, M., Draper, C., Pauquette, P., Chang, G. and Spada, F. 2020. Real-time Fluxes in a Riverine System Demonstrated via In-Situ Optical Monitoring. Battelle Conference on Remediation of Contaminated Sediments. Nashville, TN.

Venne, L., Merritt, K., Johnston, M., Draper, C., Pauquette, P., Chang, G. and Spada, F. 2020. Water Quality Data Patterns as a Baseline to Evaluate a Novel Approach for Controlling Sediment Resuspension. Battelle Conference on Remediation of Contaminated Sediments. Nashville, TN.

Merritt, K. and T. Delano. 2018. Treatability Studies to Support Engineering Evaluation for Remediation of Organically-Enriched Estuary Sediments. Battelle Conference on Remediation of Contaminated Sediments. New Orleans, LA.

Merritt, K. 2018. Analytical Methods Comparison for Analysis of Total Mercury and Methylmercury in Organically-Enriched Estuary Sediments. Battelle Conference on Remediation of Contaminated Sediments. New Orleans, LA.

Merritt, K. 2018. Geochemical Controls on Risk Reduction. Energy, Technology and Environmental Business Association (ETEBA) Conference. Knoxville, TN.

Merritt, K.A., E. Bizzotto, S. Ceccon, and C. Jones. 2011. Sedimentation Dynamics and Recovery Potential for a Mercury-Impacted Site in Plains Bay (Lago Maggiore), Italy. 10th International Conference on Mercury as a Global Pollutant. Halifax, NS.

Merritt, K.A., A. Glessner, M. Henning, V. Magar. 2011. Site Remediation through Thin-Layer Placement of a Sand Cap in the Peninsula Harbour, Ontario Area of Concern. 10th International Conference on Mercury as a Global Pollutant. Halifax, NS.

Reash, R., K. Merritt, L. Brown, and J. Goodrich-Mahoney. 2011. Mercury, Selenium, and Arsenic Concentrations in Fish Collected near Coal-Fired Power Plants along the Ohio River: Spatial Relationships and Consumption Risk Considerations. Conference on Mercury as a Global Pollutant. Halifax, NS.

Ceccon, S., E. Bizzotto, F. Colombo, K. Merritt, L. Zaninetta and R. Mozzi. 2011. Evaluation of DDx degradation in sediment of Lake Maggiore (Pallanza Bay): a case study of historical contamination. SETAC Europe 21st Annual Meeting. Milan, Italy.

Nicolette, J., M. Henning, G. Reub, J. Haasbeek, K. Merritt, M. Bock, M. Meaders, A. Clodfelter, D. Pelletier, and L. Martello. 2011. Physical, Chemical and Biological Stressors Influencing Baseline Environmental Conditions in the Gulf of Mexico Prior to the Deepwater Horizon Spill. Gulf Oil Spill SETAC. Pensacola Beach, FL.

Merritt, K.A., E. Bizzotto, and S. Ceccon. 2011. Geochronological Dating of Sediments from Pallanza Bay (Lago Maggiore), Italy. 7th International SedNet Conference. Venice, Italy.

Merritt, K.A., Amirbahman, A., Magar, V., Lotus, G., Brown, L., and Massey, D. 2010. Assessing Mercury and Methylmercury Bioavailability in Sediment Porewater using Mercury-Specific Hydrogels. Partners in Environmental Technology Technical Symposium, Washington, DC.

Chadwick, B., V. Kirtay, V. Magar, J. Conder, K. Merritt. 2010. Demonstration and Validation of Enhanced Monitored Natural Recovery of Contaminated Sediments: Baseline Monitoring Events. Partners in Environmental Technology Technical Symposium, Washington, DC.

Merritt, K.A. and V. Magar. 2009. Thin-Layer Capping of Mercury-Contaminated Sediment: Geochemical Influence on Risk Reduction. Battelle Conference on Remediation of Contaminated Sediments. Jacksonville, FL.

Merritt, K.A., V. Magar, L. Levine, S. Kwon, and U. Ghosh. 2009. Evaluation of Sorbent Amendments for in Situ Remediation of Mixed Metal- and Organic-Contaminated Sediment. Battelle Conference on Remediation of Contaminated Sediments. Jacksonville, FL.

Kirtay, V., B. Chadwick, J. Conder, M. Moreau, K. Merritt and V. Magar. 2009. Monitoring Plan Design for Validation of Enhanced Monitored Natural Recovery of Contaminated Sediments. Battelle Conference on Remediation of Contaminated Sediments. Jacksonville, FL.

Merritt, K.A., B. Chadwick, V. Kirtay, V. Magar, J. Conder, M. Greenberg, and G. Lotufo. 2008. Review of Enhanced Monitored Natural Recovery at Contaminated Sediment Sites. Partners in Environmental Technology Technical Symposium and Workshop. Washington, D.C.

Fogg, A., J. Lyndall, K. Merritt, G. Reub, and R. Szuch, R. 2008. Use Of Ecological Credit Valuation Associated With Natural Resource Damages To Establish Restoration Banking Credits At Estuarine Sites. Conference on Estuarine Habitat Restoration. Providence, RI.

Leigh, K., K. McKay, M. Whining, and K. Merritt. 2008. Evaluation of Mink and River Otter Habitat Suitability within the Peninsula Harbour Shoreline in Lake Superior, Canada. 15th Annual Conference of The Wildlife Society. Miami, FL.

Henning, M., K. Leigh, K. Merritt, V. Magar, and R. Santiago. 2008. Assessment and Mitigation of Ecological Risks Posed by Mercury and PCBs in Peninsula Harbour Sediment Lake Superior. Federal Contaminated Sites National Workshop. Vancouver, BC.

Merritt, K.A. and Amirbahman, A. 2006. Microbial Methylation Potential in Contaminated Estuarine Sediments. American Geophysical Union. San Francisco, CA.

SELECTED COMMUNITY HEALTH - VOLUNTEER EXPERIENCE (2010 - current)

- Engineers Without Borders (EWB)-USA STEM Outreach (Water) - Workshop Facilitator (upcoming)
- Sampling support and data evaluation for community drinking water protection in rural Maine (Washington County, ME)
- The COVID Tracking Project (on-line) - Race and Ethnicity Data Aggregation Team
- Work Opportunities Unlimited - Job placement and performance support for individuals with physical, mental, behavioral, legal or linguistic barriers to employment.
- Water for People (Denver, CO) - Water and wastewater sanitation survey team - Cochabamba, Bolivia - audit and review of existing NGO water and sanitation projects.
- India Street Public Health (Portland, ME) - Language support and assistance for community health clinic.
- Konbit Sante - Infrastructure Committee - Cap Haitien, Haiti. Community outreach and messaging focused on improving sanitation; field survey of community hospital.
- EWB - Mentor and interpreter - University of Maine project in El Descanso, Ecuador. Focus: improving community access to safe drinking water.
- EWB - Mentor and interpreter - University of Maine project in Dulce Vivir, Honduras. Focus: mapping and installation of a community wastewater system.

LANGUAGES

Spanish - high proficiency

CERTIFICATIONS

- Wilderness First Responder | Emergency Medical Technician - Basic (State of ME) [license inactive]
- USCG AB Limited / Sail Endorsement [license inactive]