27th BES Annual Meeting
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Abstracts

Oral Presentations

Mike Alonzo, American University

Coauthors: Darryn Waugh, JHU; Dexter Locke, USDA; Matt Baker, UMBC; Katherine Lautar, Baltimore Greenspace; Eric Fishel, Baltimore Greenspace

Monitoring the neighborhood air cooling effect of forest patches using bike-mounted thermometers

Urban trees can help to mitigate extreme heat, but we don't yet know whether a neighborhood-adjacent, contiguous forest patch or neighborhood-integrated scattered trees maximize temperature reduction. To better understand how and when a forest patch cools the surrounding neighborhood, we deployed four instrumented bicycles to measure air temperature around a forest patch in Baltimore, Maryland. Previous work in an arid zone suggests that large, irrigated green spaces can produce plumes of cool air extending hundreds of meters into adjacent neighborhoods, with spatial patterns shifting depending on wind speed and direction. Here, we will test whether a forest patch in a mesic, unirrigated zone can offer similar indirect cooling effects and, if so, how far away from the patch those benefits can be felt. This work is a proof of concept showing how we might map temperature change continuously over space and time.

Meghan Avolio, Johns Hopkins University

Coauthors: Kelsey Coates, East Carolina University

Dis-entangling the impacts of race and wealth on residential yard biodiversity in Baltimore

Patterns of plant abundance and diversity in cities has been found to be correlated with socio-economic characteristics, such as the income and race of residents. For example, higher income areas typically have greater abundance and diversity of plants compared with lower income areas. Additionally, although understudied, there is evidence that neighborhoods where residents are non-white have lower tree canopy cover and tree diversity. Critically, due to historic and on-going racism, income and race tend to be correlated, and thus it can be difficult to dis-entangle their effects from one another. Here, we studied yard plant diversity across 63 yards in Baltimore along an income gradient of ~40K to ~140K, controlling for race, where we sampled were roughly an eqully number of homes where white or Black residents lived in each

income category. At each yard we recorded information on trees and herbaceous flowering plants. For trees, we identified all trees to species and recorded their diameter at breast height, thus we have abundance, diversity, and biomass data for each yard. For flowering plants, we identified each plant to species, estimated the number of flowers per plant, and took a photo to calculate floral area of each plant. This data was collected over three years, from 2021-2023. For total number of trees, we found there was no effect of either race or income. Generally, all yards had a similar number of trees. For tree richness, number of flowering plants, and richness of flowering plants, we found only an effect of race. The yards of white residents had on average 6 tree species, 147 flowering plants, and 14 species of flowering plants, while yards of Black residents had on average 3 tree species, 38 flowering plants, and 7 species of flowering plants. Finally, for floral area we found an effect of both race and income, but not their interaction. The yards of higher income residents of both races had greater floral area compared with the yards of lower income residents. The yards of white residents also had 88% greater floral areas that the yards of Black residents. Overall, in this study we find that race is a stronger predictor of yard plant diversity and abundance compared with income. There could be several reasons for this, including cultural differences and additional unequal financial constraints.

Matthew Baker, UMBC

Coauthors: Andrew Miller, UMBC

The Geomorphic Signature of Urban Landscapes

Urbanization leaves a lasting imprint on the Earth's surface through systematic terrain modification, implemented at fine spatial scales that accumulate to produce distinctive geomorphic patterns. High-resolution (1m) topographic data offer a means to detect these signatures without considering land cover. We propose a novel, terrain-based index that captures the geomorphic signature of urban development. The index quantifies topographic variability over a 15-meter kernel and aggregates this variability across broader extents (e.g., 150 meters) to distinguish development intensities. Our results reveal terrain modifications across both spatial and temporal gradients of urbanization in the Maryland Piedmont, USA, capturing the extent and intensity of anthropogenic alteration. Along with altered slope distributions, the index reveals systematic fragmentation of hillslope flowpaths—changes that likely enhance peak flows during storm events independent of hardened surfaces. Our approach offers a new perspective for interpreting the functional consequences of urban development on landscape form and hydrologic processes.

Ken Belt, Natural History Society of Maryland

Coauthors: Bronwyn Mitchell-Strong NHSM; Joe McSharry NHSM; Thayer Young NHSM; Jeff Campbell NHSM; Glenda Weber NHSM

The Art and Science of Urban Stream Restoration or Do Urban Rivers have Rights?

Though urban streams are often seen as visually bankrupt (e.g., “Urban Stream Syndrome"), we suggest that we can still develop strong connections to them by focusing on historical, ecological and “Natural History” elements. Their condition should not be a "fait-accompli." They are unique aquatic ecosystems with impressive ecological communities. Given the context of an urban Socio-ecological landscape they are worthy of protection and appreciation, despite their long-term neglect and imagined second class status. We will discuss how urban communities can re-claim their streams using a diversity of novel restoration approaches, starting with a cultural approach that can enrich residents’ knowledge of the ecology and natural history of their urban streams. We’ll discuss nature connections and the Natural History Society of Maryland’s “Go with the Flow” program that invites folks to sample and examine live stream critters as biological wonders of Dead Run, an urban stream in Baltimore’s Leakin Park.

Shane Boehne, Baltimore City Recreation and Parks

Deer Management Planning in Baltimore City

Baltimore City is dominated by infrastructure such as row homes and industry. Although human infrastructure is far-reaching, white-tailed deer (Odocoileus virginianus) and other wildlife still find refuge across the City’s remaining natural areas. Decades of browsing pressure by ever-growing deer populations have depleted much of the understory in the City’s remaining forests. Additionally, residents living near natural areas have grown increasingly frustrated with deer-related conflicts like landscaping damage and deer-vehicle collisions. In January 2025, Baltimore City established its first Deer Management Program to strike a balance between the needs of its forests, deer populations, and residents. The program’s new Wildlife Conservation Analyst details how the program is approaching community-based deer management and how they are incorporating input from residents, experts, and community leaders to identify optimal deer management strategies.

Kehinde Bosikun, UMBC, Dept of Chemical, Biochemical and Environmental Engineering

Coauthors: Joel Moore, Towson University; Claire Welty, UMBC

Investigating mineral weathering in the Dead Run watershed via reactive transport simulation

Mineral weathering releases essential nutrients to soils and streams, regulates biogeochemical processes, and impacts soil and water chemistry. To investigate the impact of chemical weathering on stream chemistry, reactive transport simulations of mineral dissolution and precipitation were performed on the Mount Washington Amphibolite (MWA) in Dead Run watershed located in suburban Baltimore, Maryland, USA. CrunchFlow and PFLOTRAN, subsurface reactive transport models, were used to carry out the simulations. Simulations were

run for 500,000 years, representing a reasonable duration for soil formation. Primary minerals including amphibole and anorthite (Ca- and Mg-rich silicate minerals), and secondary minerals such as goethite and kaolinite (Fe- and Al-containing), which are the major minerals present in the MWA, were included in model formulations. Key factors modeled were hydrologic transport along with mineral thermodynamics and reaction kinetics. Simulation results will serve as approximations of the aqueous chemistry at the base of the weathering profile and offer insight into the geochemical conditions associated with pre-urban weathering. The ultimate goal is to quantify the influence of urban inputs (infiltration of urban-associated solutes) versus contributions from natural weathering processes on stream chemistry. To achieve this, a watershed-scale reactive transport model will be developed by coupling the reactive transport code with a hydrologic flow model such as Advanced Terrestrial Simulator or ParFlow.CLM.

Sarah D'Adamo, PhD, Baltimore Green Space

Coauthors: Clare Maffei, USGS

Pollinator Power!: A Pollinator Habitat Pilot in Baltimore City

In 2024, environmental land trust Baltimore Green Space implemented a pilot project to install and monitor pollinator habitat gardens in 12 of the city's gardens, farms and parklets, the first of its kind funded by the National Fish and Wildlife Foundation for an urban setting. This presentation will share the findings and impacts of this citizen science study of urban pollinator resources, alongside the partnerships staged with federal biologists from the USGS Native Bee Inventory and Monitoring Lab and a circular mini-economy including a local nursery, landscaper, land trust coordinator and community land stewards. In addition to lessons learned about labor, education, and cross-institutional relationships needed to sustain and expand urban pollinator habitat gardening and to enhance land use toward biodiversity and climate resilience, the results will be discussed in tandem with the latest literature about urban pollinator habitat practices and Baltimore’s changing land use terrain in 2025.

Aaron DeLong, Towson University

Critical thermal limits and locomotor performance of invasive Northern Snakeheads

Northern snakeheads (Channa argus) are invasive, large bodied, air breathing, piscivorous fish native to rivers in northeast Asia, introduced to the Chesapeake Bay watershed in 2004. The critical thermal limits, sprint performance, and the effect of brackish levels of salinity on snakeheads have not been explored. I acclimated snakeheads to 3 ecologically relevant levels of temperature and salinity and then assessed critical thermal maximum (CTmax), critical thermal minimum (CTmin), and sprint locomotor performance. C. argus thermal tolerance ranged from more than 40°C to less than 1.5°C. Sprint swimming performance was determined by acclimation temperature and was diminished in low temperature conditions. C. argus can

tolerate a wide range of temperatures in fresh and brackish waters and is capable of high locomotor performance in all but the coldest brackish waters. Environmental conditions in the Mid Atlantic or Mississippi river are not likely to impair snakehead abilities.

Peter Groffman, City University of New York

Coauthors: Alexander J. Reisinger, Ruoyu Zhang, Dexter Locke, Andrew Rosenberg, David A. Newburn, Jonathan M. Duncan, Lawrence E. Band, J. Morgan Grove, Andrew Miller, Charles Towe

Sweet spots for restoration in a coastal watershed

Reducing nitrogen delivery to coastal waters is a “wicked problem” involving tradeoffs in environmental, economic and equity domains. We hypothesized that a transdisciplinary focus on disproportionality could allow for the identification of “hot” or “sweet” spots where multiple factors converge to create opportunities to control nitrogen flux. We applied this approach to the Baltimore, MD USA region by mapping stream reaches with high nitrogen concentrations, hydrologic conditions amenable to stream restoration, high willingness to pay for restoration projects, and high social need for restoration, and subsequently identifying locations where these factors converge to create sweet spots. Our analysis suggests that sweet spots that optimize environmental, economic, and equity components of sustainability may be rare. The desire to bundle multiple benefits in the budgeting for environmental interventions such as stream restoration may create a sub-optimal distribution of these interventions in a sustainability context.

Morgan Grove, Yale School of the Environment

Coauthors: Corinne Bassett, Dexter Locke, Nancy Sonti, Jesse Caputo, Brett Butler, Iris Montague, J. Morgan Grove (please use this order for the agenda)

Urban residential landowner interest in emerging urban wood product markets: Results from a multi-city survey

Background: For the past 20 years, approximately twice as many trees were removed annually from urban areas in the U.S. as were harvested annually from the U.S. National Forest System. Yet, most of this wood is treated as waste, instead of as a potentially valuable resource to generate economic growth and sustainable cities. Residential landowners are key actors in the establishment of local urban wood economies as both a source of material and users of urban wood products, yet they remain a difficult to reach group compared with others, such as tree care companies, mill operators, public landowners. Methods: We analyze a representative survey of urban residential landowners in six U.S. cities. We assess 1) their status of participation in urban wood use systems; and 2) their interest in and perceived importance of

urban wood use products. Results: Overall, 15% of residential landowners reported purchasing or acquiring urban wood products in the past. There was more interest in lower value products like wood chips and compost than higher value products like lumber or furniture. Private sector actors, like landscaping and tree care companies, and social sources, like friends and family, were more often recognized as sources of trusted information for tree care advice than public sector sources. Conclusions: We present baseline results of, to our knowledge, the largest survey of urban wood perceptions and practices to date, which indicate a substantial group of landowners already engaged in urban wood economies and discuss potential avenues to activate participation in the future.

Angie Hood, Cary Institute of Ecosystem Studies

Coauthors: Alan Berkowitz, Cary Institute of Ecosystem Studies

Teaching the Critical Zone Through Local Urban Contexts

The Critical Zone (CZ) is “Earth’s living skin,” where rock, soil, water, air, and life interact to drive ecosystem functions that support life on Earth. The Urban Critical Zone (UCZ) cluster is investigating how urban and suburban processes influence water quality and quantity across the CZ along the Mid-Atlantic Fall Zone. Teaching CZ science through local contexts builds scientific literacy, giving students in urban areas a direct understanding of how their own communities influence Earth’s CZ. The UCZ Education and Outreach team has collaborated with local teacher fellows to design and pilot place-based curricular materials in urban classrooms along the Fall Zone. Initiatives include UCZ Data Lessons, a student-centered UCZ Data Jam competition, and professional learning workshops that support teachers in adapting these data-driven educational resources to their curriculum. Pilots in Baltimore and Philadelphia high schools have informed revisions, and upcoming efforts will expand outreach initiatives beyond the Fall Zone.

Kerrie Kovaleski, Baltimore Green Space

If You Want To Go Far, Go Together

Urban forest patches can provide critical ecological and social benefits, yet they are often overlooked by city planners and even the people living and working nearby. Baltimore Green Space (BGS) has developed a community-based science model that engages residents, local government, and academic partners to generate data that inform both neighborhood stewardship and urban policy. As any scientist knows, there are models... and then there is reality. This presentation will highlight our process, from co-developing research questions with community members and scientists, to having volunteers collect ecological data under scientific guidance, to advocating for data-driven action by neighbors and policymakers. Using our “Heat Monitor Bike Study” as a case example, we will map out the layers of planning, cost, and risk as

well as the wide variety of benefits to this complex but rewarding model. We will also share lessons learned along the way.

Nolan Menanno, American University

Coauthors: Justin Nowakowski, Shelley Bennett, Bryant Smith, Kajall Hylton, Baltimore Tree Trust

Spatial Predictors of Urban Tree Mortality in Baltimore

Extreme heat affects people and wildlife and is becoming increasingly common due to climate change. Effects of extreme heat are prevalent in urban areas where forest restoration and tree planting are important nature-based solutions for mitigating urban heat island effects. Tree planting initiatives work to increase canopy cover in urban areas, and tree survival is important for ensuring cooling outcomes of planting. In this study, we used tree monitoring data from Baltimore Tree Trust to estimate survival probabilities of planted trees after approximately two years as a function of planting method and spatial environmental variables. Survival probability varied substantially across species and as a function of container type, land surface temperature, and weather conditions. Understanding how tree survival varies across site contexts and species can help inform decision making and increase impacts of tree planting initiatives.

Anna Mothersole, University of Maryland, Baltimore County

Coauthors: Dr. Christopher M. Swan, University of Maryland Baltimore County

Leaf litter processing rates shift in response to human-modified land cover in freshwater ecosystems

The global LandComp initiative investigates how changing land use impacts biological communities and processes in freshwater ecosystems worldwide through modifying flow patterns, temperature regimes, and sediment dynamics. This work specifically examines the relationship between leaf litter breakdown in freshwater streams, surrounding land use patterns, and macroinvertebrate community composition. Using the standardized leaf litter bag methodology, we measured breakdown rates in representative streams within three distinct landscape categories (urban, forested, and agricultural) in central Maryland, USA.

The goal was to identify preliminary trends in species-specific leaf breakdown rates and macroinvertebrate assemblages across these varied environmental contexts. Preliminary analysis of LandComp collaborator locations running the same study design has revealed that both agricultural and urban land cover types significantly reduce breakdown rates compared with forested sites. These findings provide valuable insight into the cascading effects of land use

change on critical ecosystem processes and biodiversity maintenance in freshwater environments.

Daniel Pratson, University of Maryland

What's going on in the woods in backyards? Evaluating the impacts of online extension programming on natural areas management

Intentional establishment and management of natural areas within residential properties can contribute to a landscape-level matrix that supports biodiversity and related ecosystem services. However, property owners may not have background knowledge of the principles that justify certain management practices, thus, their adoption may be limited by knowledge deficiency. Extension programming has been developed and executed to provide such information to property owners across the US Mid-Atlantic, but the connections between programming and decision-making have not been made clear. Using responses from participants of an extension education course, I analyzed how owners engaged with eleven different land management practices across a total of 336 acres. All respondents engaged with at least one management practice after taking the course, however, reports of knowledge gain did not predict behavior. These preliminary findings suggest that educational programming may "nudge" pre-planned behaviors; further analysis will shed light on factors that predict management in residential properties.

Maggie Proctor, Yale School of the Environment

Strategic Planning for the Stillmeadow / Hillside Parks Collaborative

The Stillmeadow / Hillside Parks Collaborative (SHPC) is a joint effort by Stillmeadow PeacePark and Hillside Park, focused on education, stewardship, community building, and connectivity. These two independent parks share a vision for what urban green space can be and what it can do for the community, and by pooling resources, collaborating on activities, and learning from each other, they can expand their impact to reach a broader group of Baltimoreans. To inform their approach, the SHPC conducted a strategic planning exercise with support from Yale School of the Environment. This exercise included a set of interviews with representatives of non-profits, government, academia, and others, to determine areas of opportunity and need. Following this assessment, the SHPC team developed a strategic plan outlining how they can best contribute to the broader network of green space organizations, community leaders, and educators in Baltimore.

Sylvana Ross, Cornell University

Coauthors: Dr. Corrie Moreau - Cornell University

From Redlines to Ant Trails: Racism's Influence on Urban Wildlife Adaptations

Historical housing practices within the U.S. have perpetuated racial segregation, leading to low-income minority neighborhoods that are unjustly hotter, more polluted, and less green than primarily white suburban neighborhoods that are on average cooler, cleaner, and greener. By using redlining as a framework to connect historical discriminatory housing policies to current patterns of segregation and environmental inequality, this research tests whether these social legacies have shaped physiological and genetic variation in the native ant species Tapinoma sessile. Thermal assays were conducted on colonies from across Baltimore, Maryland and Philadelphia, Pennsylvania to understand their physiological adaptations to urban heat correlated with environmental injustices. Colonies from historically segregated neighborhoods showed a significant higher heat tolerance than those from historically privileged neighborhoods. The mechanisms that designed our cities with prejudice also manipulate the evolutionary paths of populations confined in our concrete.

Maggie Schaefer, University of Maryland College Park

Coauthors: Kelsey McGurrin, University of Maryland College Park, MD; Sophie McCloskey, University of Maryland College Park, MD; Anne-Lucie Pierre, Amherst College, MA, Karin Burghardt, University of Maryland College Park, MD

Examining urban tree health as a method of predicting species-specific climate adaptation

As climate change increases stress, cities may serve as an early indicator of climate effects and their future impact on trees. However, it is unlikely that all tree species will be affected by climate change similarly. Recent modelling efforts, such as those produced by the USFS Climate Change Tree Atlas, predict that some tree species will do well with a shifting climate in urban areas, while others will be unable to adapt. Our study seeks to answer: are species-specific climate predictions reflected accurately in Baltimore across a range of temperatures? We revisited young street tree cohorts of several native species originally measured in the 2018 Baltimore Tree Inventory. We selected species across climate adaptation predictions from the USFS Climate Change Tree Atlas for the Greater Baltimore region. The individual trees selected were growing in neighborhoods experiencing a gradient of air temperatures, recorded over the summer of 2018. We quantified growth and assessed different tree health and insect population metrics. Responses varied significantly across temperature and capability ranking. This knowledge can help influence urban planting decisions in anticipation of increased climate stress to ensure ecosystem services are maintained.

Robert Shedlock, Baltimore Urban Waters Partnership

Baltimore Urban Waters Flood Team Workgroup on Watershed Governance

In 2018, the Baltimore Urban Waters Partnership formed a team to focus on urban flooding. This team organized a large workshop in 2020 on the disconnect between modern flood science and existing policy frameworks. The workshop recommendations were published as an online report, by the Environmental Protection Agency. A major recommendation of the 2020 workshop and follow-up workshops is that flood mitigation, regulation, management, and monitoring should be done on a watershed basis. In 2024, the Flood Team formed a work group to focus on interjurisdictional watershed governance. This workgroup consists of staff from Maryland Department of Environment, Baltimore City, and Baltimore County in addition to members from federal agencies, academia, consulting firms, and non-governmental organizations. This workgroup is working on a white paper to promote effective multijurisdictional watershed governance and is planning shorter summaries of the white paper for interacting with citizen groups and policy makers.

Beatriz Shobe, Johns Hopkins

Coauthors: Meghan Avolio, Johns Hopkins

How The Presence Of Artificially Selected Cultivars Impacts The Genetic Diversity Of Local Urban And Rural Forests

Many cities are expanding tree canopy as trees are known to mitigate to provide a variety of ecosystem services. Planting a diverse array of species is recommended, however, studies have shown that those recommendations are often not put into practice. Trees that can tolerate difficult urban conditions are preferentially planted. Many of the planted trees are cloned cultivars that have very limited genetic diversity. Homogeneity of both genetic makeup and species makeup can expose trees to other threats and create a community that lacks resilience, especially in the face of climate change and/or invasive pests. This study examines the genetic diversity of two commonly planted species: Acer rubrum (red maple) and Acer platanoides (Norway maple). As urban trees are increasingly under stress from climate change, invasive species, and diseases, understanding the genetic diversity of urban trees and forests will help us to maintain more resilient and robust urban vegetation.

Patrick J. Terhune, UMBC, CBEE & CUERE

Coauthors: Mary McWilliams, UMBC; Claire Welty, UMBC; Joel Moore, Towson U.; Dan Bain, U. Pittsburgh

Analysis of potential sulfate sources in headwater streams in Dead Run watershed

Intensive sampling of the Dead Run stream network from 2021-2024 revealed unexpectedly high concentrations of sulfate at headwater locations. In an effort to link stream sulfate concentrations to source materials, we embarked on a program of sampling riparian soils near five identified stream “hot spots”. Thirty-two soil core samples were collected at these five locations. ANOVA statistical analysis revealed proximity of the sample to the stream and depth of the sample as statistically significant factors related to the concentration of extractable sulfate. Riparian soil sulfate concentrations ranged from 2.0 mg SO4/kg soil to 740 mg SO4/kg soil. Higher sulfate core sample concentrations occurred within ~ 1 m from the stream edge and increased with depth. Analysis of mortar and asphalt samples indicate potential base flow interactions with these anthropogenic sulfate sources. Variation between control samples and stream samples indicate that water and soil interactions could lead to increased soil sulfate concentrations.

Poster Presentations

John E. Dorband, UMBC

River Sense: Real-Time Sensor Monitoring of Stream Dynamic

Reliable stream monitoring is critical for understanding water quality, flow dynamics, and ecosystem health. This project develops a low-cost, modular sensor system capable of collecting real-time data using temperature in riparian zone waterways. The design integrates I-Buttons, also known as Thermochron sensors, to data log records of temperatures within streams at 15 min intervals. After logging the data, R studio is then used to generate statistical values such as slope of minimum and maximum temperatures, and the frequencies of wet days detected by sensors to illustrate and communicate stream behavior and different hydrological patterns. This system enables continuous data collection, supporting both scientific research and community-based watershed management. River Sense provides a model for scalable, distributed monitoring networks that can improve decision-making in water resource management and foster broader engagement in environmental stewardship.

Gemma Feild, University of Maryland, Baltimore County

Coauthors: Dr. Christopher Swan, UMBC

Assessing the impacts of urbanization on snakes in Central Maryland

Urbanization is a major threat to biodiversity, but research into urban effects on biodiversity is not uniform amongst species. Snakes are essential in ecosystem functioning, pest control, and disease regulation. These ecosystem services are critical in cities, but how urbanization affects snakes is not thoroughly understood. This research aims to assess the effects of urbanization on snakes in Maryland by exploring biodiversity, size, and functional diversity. We hypothesize:

1) urban biodiversity will be reduced; 2) urban snakes will be smaller; and 3) urban habitats will favor generalist species. Citizen science data reveals urban and non-urban environments host different species and functional diversity. This project uses field data to further explore this pattern, adding body size to evaluate how physiology responds to urbanization. Our findings will contribute to knowledge on urban snake ecology and conservation. Data will be shared with MDNR and used for outreach with Baltimore Greenspace.

Laundette Jones, University of Maryland, Baltimore

Coauthors: Eberechi Mbadugha1, Imani Ward2, Habeebat Adekoya3, Mounika Atmakuri4,5, Sridhar Reddy Maram4,5, Yorell Tuck5, Attia Robinson5, Michael Martin5, Charles Brooks5, Dante' Upshaw5, Brian Jones6, Erin Walton7, James Wright7, Diane Marie St. George7, and Laund

From Forest to Future: Stillmeadow PeacePark as a Classroom for Health Equity

Stillmeadow PeacePark is a 10-acre urban forest in Southwest Baltimore and a site for ecological restoration and relationship building. What began as caring for the land grew into building trust, resilience, and partnership across diverse community members. Building on this foundation, Stillmeadow and the University of Maryland School of Medicine's MPH Program launched an innovative partnership to train future health professionals who embody relational health, humility, and solidarity while contributing meaningfully to community priorities. This presentation shows how the PeacePark serves as a living classroom for Community-Engaged Interprofessional Education (CE-IPE) initiative, cultivating future doctors, scientists, and public health leaders who understand that health equity is rooted in both people and place. Reflections from these experiences show how students are being transformed to embrace a holistic view of health—one grounded in relationships, equity, and community well-being.

Cameron Lockett, University of Maryland, Baltimore County

Coauthors: Christopher Swan, University of Maryland, Baltimore County

The Urban Effect: Urbanization and its Impacts on Ecological Interactions

Urbanization may cause behavioral changes in some organisms, and both may lead to changes in ecological interactions. To further understand the effects of urbanization on such interactions will look at the relationship between crayfish and branchiobdellidan worms. Crayfish and branchiobdellidan worms work well as a model system, because they have an established context-dependent relationship and are abundant in freshwater ecosystems. The objective behind the study was to see if there are any changes in the community structure of crayfish and branchiobdellidan worms depending on the degree of impervious cover in a drainage. Previous research has shown that as stream order increases so does the average amount of impervious

surface cover. We sampled 24 sites evenly between first, second, and third order streams. Results suggest an overwhelming negative effect on native crayfish abundance as well as the presence of worms due to non-native species.

Mary McWilliams, UMBC/CUERE

Coauthors: Eveyln Sangree, Cornell University; Claire Welty, UMBC; Andy Miller, UMBC; Jon Duncan, Penn State; Pater Groffman, CUNY and Cary Institute

Estimation of suspended sediment loads using high-frequency turbidity data at BES stream chemistry stations

In 2023 we deployed high-frequency sensors at the Baltimore Ecosystem Study stream sampling sites to measure a suite of chemical parameters, to complement the 27-year record of weekly grab-sample data. In summer of 2025, we focused on deploying ISCO samplers at 5 sites, to develop correlations between suspended sediment in storm samples and in-stream turbidity. 179 storm samples were collected across POBR, BARN, GFGB, GFVN, and MCWA and analyzed in the lab for suspended sediment using standard methods. Power fits to log-log data yielded remarkably similar results across the urban-to-rural gradient, with power exponents ranging from 0.83 to 1.6. These results, coupled with USGS discharge data available for all sites, were used to estimate monthly suspended sediment yields. Results exhibit clear seasonal trends, as well as a contrast in yields as a function of intensity of development. This work is part of the Baltimore Social-Environmental Collaborative Urban Integrated Field Laboratory, supported by DOE.

Mahjabin Afroj Mila, UMBC, Department of Chemical, Biochemical and Environmental Engineering

Coauthors: Claire Welty, UMBC; Maryam Risheri, UMBC

Coupled Groundwater–Surface Water Modeling of Maiden's Choice Run Using ParFlow.CLM

This study develops a high-resolution ParFlow.CLM model for Maiden's Choice Run, an urban watershed in Baltimore, Maryland, to investigate the interactions between groundwater and surface water under recent climatic conditions. The model setup included: acquisition and processing of digital elevation data, slope generation using GRASS GIS, an overland flow test to ensure that the domain drains completely, acquisition and reclassification of land cover, generation of hydrogeologic layers with variable permeability, and preparation of NLDAS-2 meteorological forcing data. Spin-up simulations were performed to bring the system into balance, prior to transient runs beginning in 2023. Going forward, the model will be used for three objectives: (1) evaluating the potential to predict whether simulated groundwater levels can predict basement flooding during storms, (2) applying backward particle tracking with

ECOSLIM to assess the correlation between stream water chemistry and land use/land cover, (3) comparing water quantity results (prediction of stream discharge, aquifer levels) to other hydrologic models (HEC-RAS, SWMM, CityCat) being applied to the watershed. This implementation provides a basis to evaluate hydrologic model robustness and improve understanding of hydrology in urban settings.

Gemma Watson, Johns Hopkins University

Coauthors: Beatriz Shobe

Urbanization does not affect the genetic diversity of the self-incompatible perennial plant red clover (Trifolium pratense).

Urbanization driven habitat loss and fragmentation is one of the most defining factors influencing global ecosystem change. Previous studies have found that urbanization significantly decreases pollinator abundance and diversity. It is possible that this decline in quality of pollination is affecting the genetic diversity of urban plants, especially those species that require pollination to reproduce. In this study, samples from 96 individuals of red clover (T. pratense), a common and self-incompatible plant, were collected. 48 of these individuals came from a rural habitat, with the other 48 from an urban habitat. The genetic diversity of these populations was compared between themselves, as well as between habitats, using microsatellite markers in 10 loci. It was determined that several factors of genetic diversity in the urban and rural landscapes separately were not significantly different from the genetic diversity of both landscapes combined. This result suggests that gene flow between these two habitats may not be significantly impeded.

Darryn Waugh, Johns Hopkins University

Coauthors: Baltimore Community Weather Network

The Baltimore Community Weather Network

Quantification and understanding of how heat and rainfall vary within cities are needed to identify the area with the worst conditions, develop solutions to extreme weather, and assess the impact of proposed policies. However, neighborhood-level variability is not well quantified because there are few environmental measurement stations within cities. The Baltimore Community Weather Network (BCWN) is a partnership between universities, state agencies, and Baltimore residents that aims to address this data gap in Baltimore. BCWN has deployed over 50 weather stations in and around Baltimore City. The data collected are enabling the mapping of urban weather across the city, identification of the causes (e.g. variations in green and impervious surfaces) of this variation, and the testing of models and proposed mitigation

strategies. In addition, and perhaps more importantly, the network provides direct community involvement, with increased community engagement, education, and empowerment.

Claire Welty, UMBC/CBEE & CUERE

Coauthors: Mary McWilliams, UMBC; Andy Miller, UMBC; Bob Bathurst, SmartSWM; PJ Terhune, UMBC

Evaluation of pollutant removal effectiveness of stormwater facilities using high-frequency water quality sensors

We are outfitting inlets and outlets of three stormwater facilities in Dead Run watershed with high-frequency sensors to estimate load reduction of total nitrogen, total phosphorus, and total suspended solids. Under Maryland requirements, pollutant removal effectiveness must be demonstrated using laboratory analysis of grab samples spanning entire storms, which can be challenging to collect. We aim to demonstrate correlation of grab samples TN, TP, and TSS to relevant sensor data, such that sensor data can be used as an adequate proxy in pollutant removal calculations. In addition, we are installing SmartSWM Continuous Monitoring and Adaptive Control technology after one year, to test the hypothesis that CMAC can be used to enhance pollutant removal in addition to flood control. Facilities being instrumented include one wet pond and two extended-detention dry ponds. Sensor data include specific conductance, temperature, turbidity, nitrate, and discharge. System design and initial data will be presented. This work is supported by Chesapeake Bay Trust.

Ruoyu (Roy) Zhang, University of Virginia

Coauthors: Dan Pelletier, University of Virginia; Larry Band, University of Virginia

Estimating and understanding I&I and its interactions with ecohydrology in Baltimore using empirical and modeling approaches

Infiltration and Inflow (I&I) into aging sanitary sewers is a significant challenge in urban water management, causing overflows and increasing wastewater treatment loads, and Baltimore City has done substantial work to reduce I&I. In this study, we derived empirical I&I estimates from Baltimore DPW sewer meter data and used them to calibrate the sewer leakage rate in Regional Hydro-Ecologic Simulation System (RHESSys). Our results show spatial patterns of I&I and how I&I could impact ecohydrological processes (e.g., ET) within the watershed. The study also highlights the importance of considering I&I to improve the prediction of dormant-season streamflow in urban watersheds, which helps to better estimate nutrient export from Baltimore.