Cary Institute of Ecosystem Studies

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Shannon L. LaDeau, Disease Ecologist

Research mission:

- Evaluate how urban greening influences biodiversity function and sustainability outcomes
- Understand how mosquito- and tick-borne diseases move through urban landscapes; identify where people are most at risk.
- Advance real-time forecasting of disease vector populations, to refine predictions of disease risk and inform management practices.

Summary:

Shannon LaDeau investigates interactions between social and ecological components of ecosystems. Her research often sits at the intersection between ecology and environmental justice. In Baltimore, for example, LaDeau and colleagues revealed a connection between affluence and mosquito traits, due to differences in the composition of vegetation affecting resources for mosquito growth. Her work has improved understanding of how complex socio-ecological dynamics shape variation in mosquito-borne disease risk.

Another common theme in LaDeau's work is exploring how diversity — including biodiversity, cultural diversity, and diverse experiences, traits, or actions — influence ecosystem function and resilience. Currently she is studying how urban greening shapes plant and animal biodiversity and public health in the city of Poughkeepsie, New York. The project asks what biodiversity in the city means, how it functions for different groups of humans and nonhumans, and what it may take to produce equitable, just, urban conservation in a climate-changed future.

LaDeau is working to advance the field of ecological forecasting, with the aim of generating science-based predictions and responses to real societal challenges. Leveraging data from Cary Institute's long-term study of Lyme disease, for example, LaDeau and colleagues are laying the foundation for real-time forecasting of tick populations. Their model integrates four stages of the tick life cycle — larvae, nymph, dormant nymph, and adult — together with weather variables and host population abundance to generate more accurate predictions. By applying ecological forecasting to ticks and other disease vectors, LaDeau hopes to refine predictions of disease risk and inform management practices that reduce risk.

LaDeau is a member of the Science, Technology & Education Advisory Committee for National Ecological Observatory Network.

Select publications:

Foster J, LaDeau S, Oggenfuss K, Ostfeld R, and Dietze M. 2024. **A modified matrix model to describe the population dynamics for the primary vector of Lyme disease in North America**. *Ecosphere*.

Lofton ME, Brentrup JA, … LaDeau SL. 2022. **Using near-term forecasts and uncertainty partitioning to inform prediction of oligotrophic lake cyanobacterial density**. *Ecological Applications*.

Anderson EC, Avolio ML, Sonti NF, and LaDeau SL. 2021. **More than green: Tree structure and biodiversity patterns differ across canopy change regimes in Baltimore's urban forest**. *Urban Forestry & Urban Greening*.

Katz G, Leisnham PT, and LaDeau SL. 2020. ***Aedes albopictus* body size differs across neighborhoods with varying infrastructural abandonment**. *Journal of Medical Entomology*.

Rothman S, Jones JA, LaDeau SL, and Leisnham PT. 2020. **Higher West Nile virus infection in *Aedes albopictus* and *Culex* mosquitoes from lower income neighborhoods in urban Baltimore, MD**. *Journal of Medical Entomology*.

LaDeau SL, Allan BF, Leisnham PT, and Levy MA. 2015. **The ecological foundations of transmission potential and vector-borne disease in urban landscapes**. *Functional Ecology*.

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