Cary Institute of Ecosystem Studies

Amy Zanne, Ecologist and Evolutionary Biologist

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Research mission:

- Understand what drives carbon emissions across environmental gradients
- Determine how, after plants die, their construction influences the release of greenhouse gases by decomposers, such as fungi and termites
- Investigate how species adapt to different environments, and how those adaptations shape ecosystem processes

Summary:

Amy Zanne leads several international efforts to understand how interactions among plants, microbes, and insects affect the global carbon cycle. This research is critical for generating accurate climate change projections.

Two of her current projects focus on carbon fluxes where different ecosystems intersect. These boundary areas are common ecosystem features, but their carbon emissions are poorly understood. One project explores how warming and loss of snowpack affect soil carbon emissions in the Chilean Andes, Patagonia, and the Antarctic tundra. Another project examines seasonal wetlands in Brazil that connect dry grasslands with ever-wet peatlands. The team is mapping these intermittent wetlands to estimate current carbon emissions and how they might shift under changing climates.

Another line of inquiry investigates what happens to the carbon stored in trees after they die. Zanne studies how tree decomposition is shaped by the structure of wood, environmental conditions (temperature, moisture), and the presence of decomposers, such as fungi and termites. This information is vital to understanding how quickly carbon is released from dead trees, what form emissions take (carbon dioxide vs. methane, a more potent greenhouse gas), and where the carbon ends up: stored belowground or in the atmosphere.

Underpinning these studies is Zanne's passion to understand how evolution has shaped the ability of plant, microbe, and termite species around the world to live in a variety of different habitats. In turn, she is also interested in how the adaptations they evolve impact ecosystem processes, such as the cycling of carbon and other nutrients — processes critical to the function of individual ecosystems and the Earth System as a whole.

Select publications:

Wijas BJ ... and Zanne AE. 2024. **The role of deadwood in the carbon cycle: Implications for models, forest management, and future climates**. *Annual Review in Ecology Evolution and Systematics.*

Flores-Moreno H, … and Zanne AE. 2024. **Shifts in internal stem damage along a tropical precipitation gradient and implications for forest biomass estimation.** *New Phytologist.*

Zanne AE, et al. 2022. **Termite sensitivity to temperature affects global wood decay rates.** *Science.*

Zanne AE, et al. 2020. **Fungal functional ecology: Bringing a trait-based approach to plant-associated fungi.** *Biological Reviews.*

Zanne AE, Pearse W, Cornwell W, McGlinn D, Wright I, Uyeda J. 2018. **Functional biogeography of angiosperms: life at the extremes.** *New Phytologist.*

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