

# Claire Horner-Devine

*Research Assistant Professor*

*Specialities: microbial ecology, community ecology, diversity and ecosystem function, biogeography*

*BS, Princeton, 1996; PhD, Stanford, 2004*

*Focus: Patterns of diversity and community composition (ecology of diverse communities)*

<http://fish.washington.edu/horner-devine>

Claire Horner-Devine joined the SAFS faculty in fall 2004. After earning her BS degree, Claire taught high-school biology and environmental studies, and designed a course that focused on drawing students into environmental science through social issues. Her students were interested in the role of diversity in providing ecosystem goods and services—processes and products of a functioning ecosystem that sustain and benefit human life. “For example,” she said, “a healthy ecosystem can provide water purification, crop pollination, or soil conservation.”

At Stanford’s Center for Conservation Biology, Claire conducted PhD research on butterfly community ecology in a Costa Rican agricultural landscape. She sought to understand how forest patches and their surrounding areas—the “matrix,” which includes human development and activities like agriculture—interact to support a diverse faunal community. Claire then shifted her attention to the ecology of microorganisms, in large part to address the issues that captivated her high-school students—how diversity is distributed and what the relationship is between diversity and ecosystem services.

“Microbes are responsible for many critical ecological processes, like decomposition, trace gas emissions, and nitrogen cycling,” Claire said. “They represent the majority of biomass, diversity, and evolutionary history on earth.” An issue that interests her is whether patterns and processes can be generalized across organisms. She elaborated: “Do patterns extend across all evolutionary history and all domains of life?”

Claire has used both small, contained freshwater ecosystems—“mesocosms”—and field sampling to study patterns and processes of microbial communities. She has studied how freshwater bacterial communities change over a productivity gradient, and examined the spatial distribution of bacteria to show that the number of microbial taxa increases with the sample area size, similar to most macroorganisms.

Claire’s research has a practical side—determining whether natural systems can recover from disturbance. She cited three examples: One relates to the role of microbes in restoring ecosystems—can the present microbes restore ecosystem processes or must their composition change? Another pertains to dumping nutrients into aquatic systems—how does microbial composition determine system response to such anthropogenic



Roger Fuller

*Claire Horner-Devine (left) and Jennifer Hughes collect samples to study the spatial distribution of salt-marsh sediment bacteria.*

pressure? And, on a global scale, how might climate change influence microbial communities and the processes they mediate?

Why focus on aquatic microbes? Claire answered, “We still have much to learn about microbial communities living in aquatic systems and the role they play in biogeochemical processes and food webs. Because microbial diversity may be lower in water than in soil, it may be easier to sample a relatively large part of the community and thus have a clearer window into community and population dynamics.”

At SAFS, Claire plans to combine her mesocosm approach with field studies to examine the effects of climate change on aquatic communities, learn how microbial communities and processes change over time, and learn more about feedback between microbes and organisms in the context of invasions.

Claire sees excellent opportunities for interdisciplinary exposure at the SAFS–Oceanography Marine Molecular Biology Lab: “Someone working on bacteria can be right across the bench from someone working on sharks.” She added, “I think the school and the college are hot spots on campus for evolutionary and ecological research.”