The rapid spread of infectious diseases in humans, wildlife and crops is posing novel challenges in the way and speed that we traditionally respond to biological threats. Recent die-offs of sea-stars, amphibians and bats demonstrate that the emergence of multi-host pathogens leaves a clear trace of disease-driven loss of biodiversity in natural habitats and impacts ecosystem function and stability. My research aims to identify and quantify the ecological factors and evolutionary processes involved in species persistence during and after disease outbreaks. In this talk, I will discuss the impacts of two fungal pathogens: *Batrachochytrium dendrobatidis* (Bd) and *B. salamandrivorans* (Bsal). These skin fungi are causing mass mortality events and population declines of amphibians around the world. I will examine host-pathogen interactions in different stages including disease emergence in naive amphibian community and during seasonal cycles of epidemic/endemic pathogen dynamics. I will highlight the opportunities in the development of proactive measures to prevent *Bsal* from invading United States and the Americas.