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Modelling Foraging Behavior in Ecological Dynamics

Foraging behavior is often highly flexible, with individuals adjusting how, when, and where they feed in response to changing environmental conditions and predation risk. In this work, a set of mechanistic models is developed to investigate how such foraging flexibility shapes population dynamics and ecosystem functioning. First, consumer–resource models are formulated in which attack rates adapt to food availability and population density, capturing behavioral feedback between foraging effort and resource depletion. Second, nutrient balance and food quality are incorporated into stoichiometric foraging models that link diet choice to growth efficiency and energy allocation. Together, these complementary frameworks demonstrate how flexible foraging decisions, grounded in explicit mechanistic processes, can stabilize or destabilize ecological dynamics and generate diverse outcomes in community structure and resilience.