
AO LI, University of Western Ontario

Modelling the fear effect on prey population in patchy environment

Empirical results and theoretical analyses reveal that fear alters the behaviours of prey then influences its population size. In most cases, animals are observed to reduce activities to avoid being captured by predators at the cost of growth, which also results in the reduction of movement. We formulate a two-patch model incorporated with dispersal. Survival of prey is possible in a poor environment if prey from both patches can move freely to the other at a low rate. Using methods of adaptive dynamics to study the evolution of anti-predation strategy, we show that in an isolated patch there may exist a non-zero optimal strategy which is both an evolutionary stable strategy (ESS) and a convergence stable strategy (CSS). Numerical simulations are given for the two-patch model, implying that anti-predation strategy plays an important role in the long-term population dynamics of prey and an optimal strategy may exist which is stable in evolutionary sense.