

# Ecosystem Simulation Study

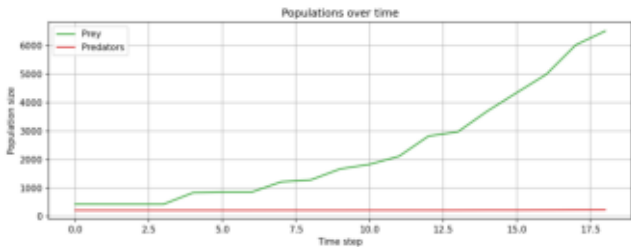
Vilnius University • Vytautas Bitinas • December 16, 2025

Overview: This project simulates predator-prey ecosystem dynamics. Agents navigate terrain with resources, competing for food, reproducing, and aging. The simulation tracks population trajectories and visualizes terrain resources.

Key Parameters: Prey consume plants and expend energy moving. Predators hunt prey, gaining energy but expending movement cost. Both reproduce above energy thresholds and die of old age or starvation.

## Results & Figures

(a) Population Dynamics



(b) Terrain & Resource Distribution (Final)

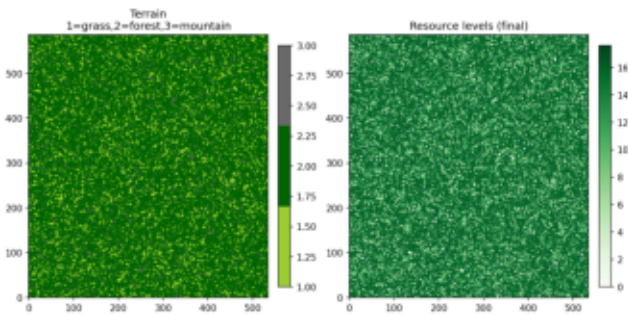


Figure (a) shows prey (green) and predator (red) populations over time, exhibiting cyclic dynamics driven by predator-prey feedback. Figure (b) displays the final terrain map (grass, forest, mountain) and resource distribution, revealing spatial heterogeneity.

Key Observations: Population cycles reflect predator growth lagging prey abundance. Resource distribution is uneven due to terrain-dependent regrowth. Simulation models realistic ecological constraints: overcrowding, starvation, and predation risk.