

# HEP Agent Simulation Framework

## Model Documentation

January 20, 2026

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# Chapter 1

## Introduction

This document describes the mathematical and logical model underlying the Human Ecology Project (HEP) Agent Simulation.

## Chapter 2

# Environment Model

### 2.1 Grid Structure

Description of the spatial grid, resolution, and coordinate system.

### 2.2 Habitat Suitability (HEP)

Description of the HEP index and how it influences agent survival and movement.

## Chapter 3

# Agent Dynamics

### 3.1 Population Structure

Definition of agent attributes (age, gender, energy, etc.).

### 3.2 Movement Rules

Logic governing agent migration and dispersal.

### 3.3 Demographics

#### 3.3.1 Birth

Rules for reproduction and fertility.

#### 3.3.2 Death

Mortality risks including starvation, age, and environmental factors.

## Chapter 4

# Interaction Model

### 4.1 Resource Competition

How agents compete for limited resources in a grid cell.