MEASURING AND MODELLING POPULATION CHANGE

Part 2

Population Growth Models

Biotic Potential - highest possible per capita growth rate

Factors that determine biotic potential:

1. Number of offspring in one cycle
2. Number of offspring that survive long enough to reproduce
3. Age of reproductive maturity
4. Number of times individuals reproduce in life span
5. Life span of individuals

Population Growth Models

Exponential and geometric growth never occur indefinitely in nature, since resources are never unlimited

As population nears carrying capacity of environment, growth rate slows to zero

Result is logistic growth curve

Most common growth pattern seen in nature

$$\frac{dN}{dt} = r_{\max} N \left[\frac{(K - N)}{K} \right]$$

r_{max} = max. intrinsic growth rate

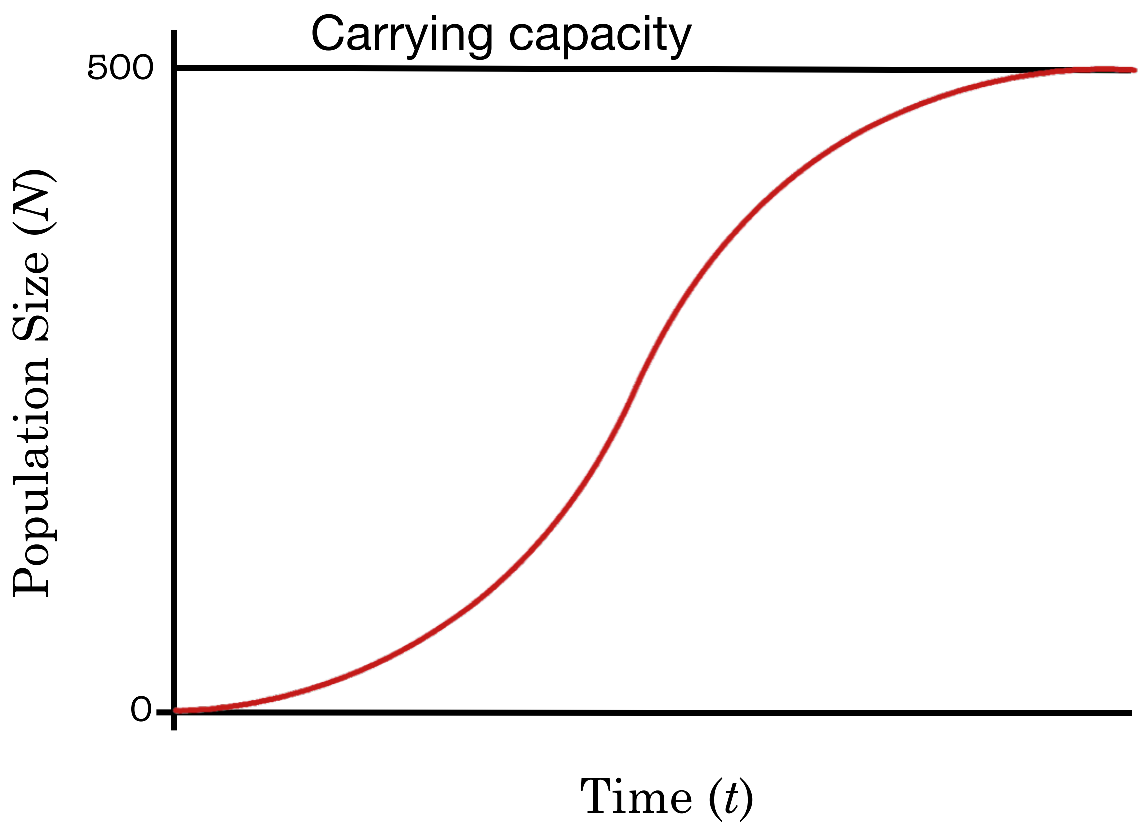
N = pop. size at a given time

K = carrying capacity

Logistic Growth

K = 500

N = 500

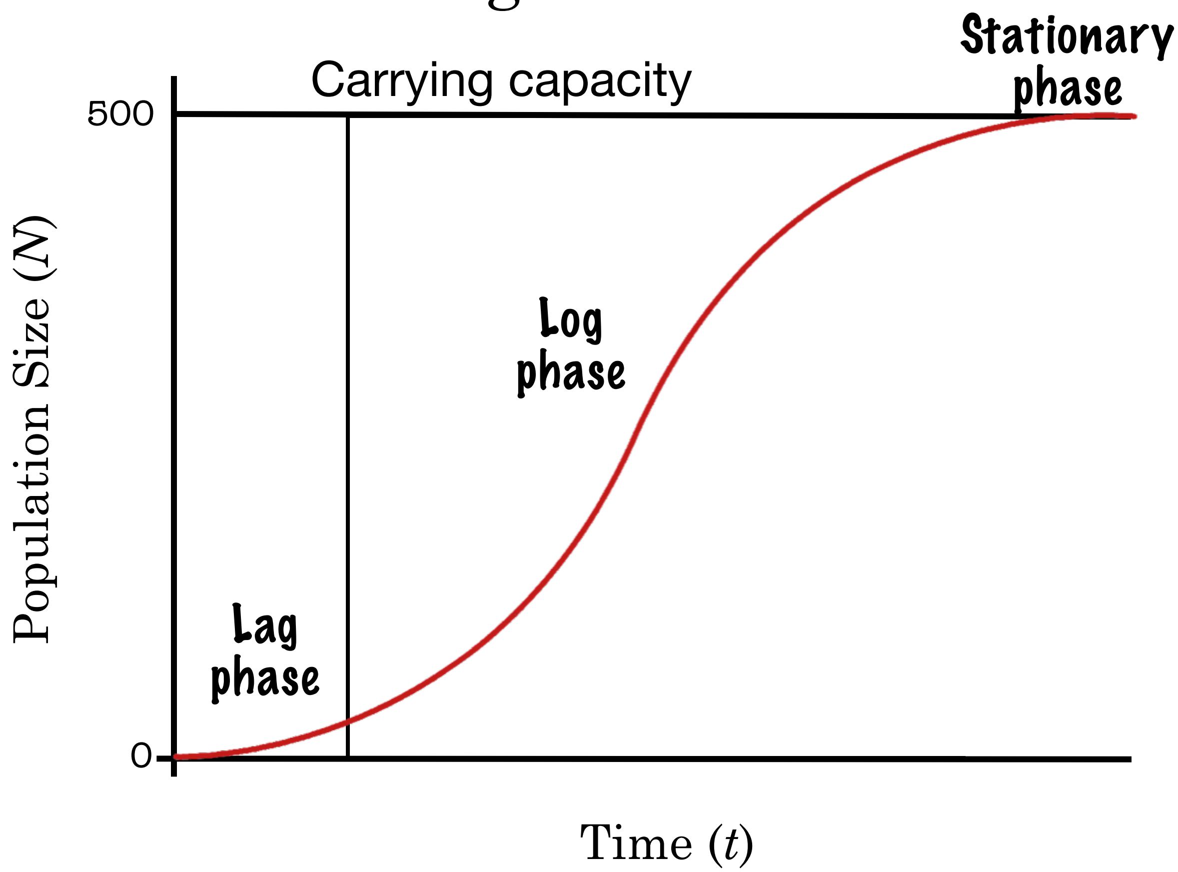


$$\frac{dN}{dt} = r_{\max} N \left[\frac{(500 - 500)}{500} \right]$$

Notice: When population size (N) is close to carrying capacity (K), expression [(K-N)/K] approaches zero

***Growth rate becomes zero

Logistic Growth



Logistic growth curve - s-shaped sigmoid curve

Curve has 3 distinct phases:

* Lag phase - when population is small and rate of increase is slow
* Log phase - rapid growth which slows as population nears carrying capacity
* Stationary phase - population is at dynamic equilibrium