

### Invasive, Endemic and Indicator Species

An **invasive** species is a species which is not native to the ecosystem and causes harm to that ecosystem. An **endemic** species is a species whose habitat is restricted to a particular area or space on the globe. An **indicator** species is sensitive to slight environmental changes and therefore serves as an early warning indicator for things such as global warming or chemical changes.

### Effects of Acid Rain

Soil	Burn skin of earthworm and increases soils acidity (lowers the pH)
Vegetation	Damages the waxy coating that protects leaves from infection and affects plants roots ability to absorb nutrients
Water	Makes bodies of water more acidic (lowers pH)
Aquatic Animals	Dissolve the shells of shellfish

### Soil Types

Sandy Soil	Large sand particles, permit root growth and air pockets, permit water to drain away quickly, carrying essential nutrients, away from roots, less fertile than loam soil
Loam Soil	Has rock particles, has pockets that hold air o water, lots of humus, drains well without drying out, most fertile soil
Clay Soil	Small particles packed tightly together, plant roots do not grow well, block root growth, and trap water, making soil wet, least fertile soil (Houston)

### Exponential Growth Formula

Formula:  $P(t) = P(\text{initial})e^{(rt)}$

$P(t)$  = Population at time

$P(i)$  = Initial Population

$t$  = time

$r$  = rate of increase (or  $r_{\text{max}}$ )

$e$  = exponential growth

### Species Diversity Levels

Alpha	Within Habitat
Beta	Between communities
Gamma	In a region

### Logistic Growth Formula

$dN/dt = R_{\text{max}}N(K-N)/(K)$

$dN/dt$  = The population at certain times

$r_{\text{max}}$  = Maximum growth rate

$N$  = Logistic Growth

$K$  = carrying capacity

### Terminology

Density-dependent Limiting Factors: Limiting factors that operate more strongly on large populations than on small ones

Limiting Factors

Tertiary Consumer: An organism that eats secondary consumers

Commensalism: Beneficial to one species but neutral to another

10%: amount of energy transferred from one trophic level to another

uniform species distribution: individuals are equally spaced apart a seen with allelopathy

covert life table: recording the death of a group of individuals born at relatively same time

Type 1 Graphs: organisms have lower mortality rates at low ages which gradually increase with age (humans)

Type 2 Graphs: organisms that have mortality rates that stay the same throughout life (birds lizards)

Type 3 Graphs: organisms that have the largest mortality rates at birth (fish, oysters frogs)

Exponential Growth Rate: occurs when the growth rate remains the same while the population grows. it creates a j shaped curve

### Cellular Respiration

Cellular respiration is a process in which the plant uses the stored energy (sugar) and  $O_2$  produced in photosynthesis and it converts and releases it as  $CO_2$ ,  $H_2O$  and energy. The plant is able to use this released energy for cellular functions such as; movement, growth and reproduction. The formula for this equation is  $C_6H_{12}O_6 + O_2$  in to  $CO_2$ ,  $H_2O$  and energy. Both plants and animals undergo cellular respiration.



### Ex-situ and In-situ Conservation

**Ex-situ** This conservation method is when we remove the species from their natural habitat. This method is used when a species habitat is threatened or no longer exists or if the existing population is extremely small.

**In-situ** This conservation method is focused on conserving the species in their natural habitat

### Pyramid of Energy

Energy loss and transfer between trophic levels. Species in the highest trophic levels have less energy available to them than the species near the bottom. Energy pyramids begin with producers on the bottom (such as plants) and proceed through the various trophic levels (such as herbivores that eat plants, then carnivores that eat herbivores, then carnivores that eat those carnivores, and so on). The highest level is the top of the food chain

### Keystone Species

A keystone species is a species that when added or removed from an ecosystem leads to major changes in abundance or occurrence of at least one other species.

### Protecting Endangered Species

The plans to protect endangered species involves:

- > Governments, industries and communities working together
- > Identifying the specific causes of the problem
- > Developing specific plans to fix the problems
- > Monitoring conditions to check that the actions taken are working

### Terminology

**Natality** birth rate

**Parasitism** Type of symbiotic relationship in which one species benefits and the other is harmed (tick)

**Steady State** Final stage in logistic growth in which birth rate = death rate

**homothermal** maintain constant body temperature

**Poikilotherm** body temperature fluctuates based on outside conditions

**cohort life table** recording the death of a group of individuals born at relatively same time

### Terminology (cont)

**static life table** recording the age of death of a group of individuals. assuming they have experienced the same events

**interference competition** organism fight physically for resources

**exploitation competition** organisms consume scarce resources

**recourse partitioning** organisms split the recourse to avoid competition

**amensalism** one organism is damaged or killed and the other is infected usually caused by chemical secretion

