Year 7 Ecology Higher

4.7 Ecology

START

Grass → Grasshopper → Mouse → Owl

Producer → Primary consumer → Secondary consumer → Tertiary consumer
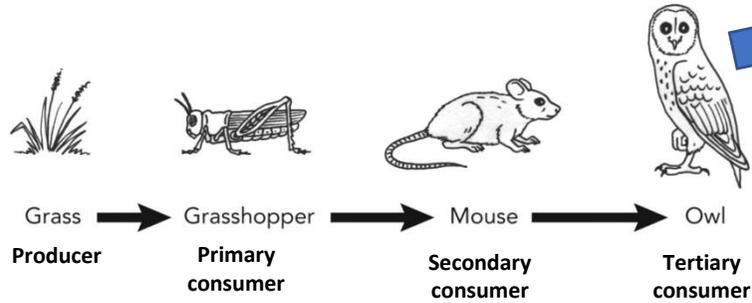
A food chain shows how energy is passed through organisms and how they all depend on one another

Abiotic Factors (environmental factors that are non-living)

Temperature, pH of soil, Oxygen and carbon dioxide, Sunlight, wind

Biotic Factors (environmental factors that are living)

Food, Pathogens
Competition for mates
Competition for food

Plant Adaptations
- Deep roots to find water
- Shallow roots absorb rain water
- Thick stem to store water
- Leaves reduced to spines to reduce surface area for water loss by transpiration
- Spines also prevent animals eating the plant to get water.
- Curled leaves to prevent water loss from stomata
- Waxy cuticle on the leaf to prevent water loss

Animal Adaptations
- Thick fur to provide insulation, stopping heat escaping.
- Large paws spread the weight of the animal and prevent it sinking into the snow.
- Small ears reduce the surface area to volume ratio. Small surface area means less surface for heat energy to escape from.
- A coat that provides camouflage, so predators or prey are not easily seen.
- Long legs, long necks or big ears increase the surface area to volume ratio. This allows more heat to be lost to cool down.
- Behaviours, such as being nocturnal to help avoid predators or because it is cooler at night.

population

— prey   — predator

time

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The graph shows that when the numbers of prey increase, the numbers of predators increases after and this causes a decrease in the number of prey. This then causes a decrease in the number of predators and this cycle continues on.
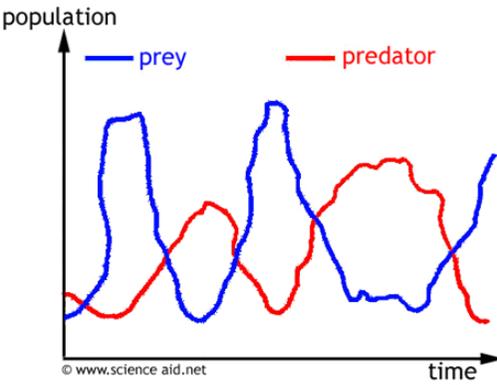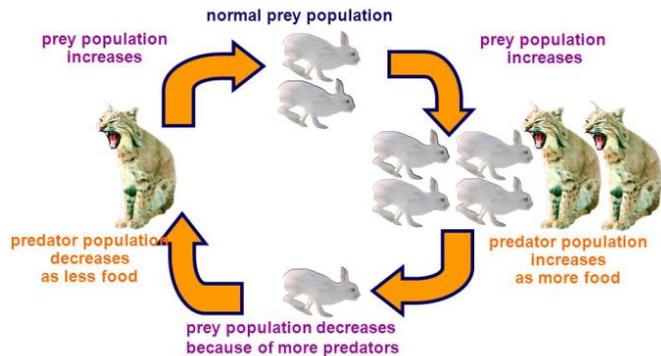
Key words:
1. **Habitat:** A small area of an ecosystem where an organism lives e.g. under a log or in a forest
2. **Community:** A collection of organisms of different species that live and interact with one another within an ecosystem.
3. **Ecosystem:** All the organisms in one habitat, plus the environmental factors that effect their survival.
4. **Interdependent:** Organisms in an ecosystem rely on each other for survival.
5. **Producer:** Makes their own food/energy through photosynthesis (plants).
6. **Primary consumer:** Herbivores that eat producers.
7. **Secondary consumer:** Eat primary consumers.
8. **Tertiary consumer:** Eat secondary consumers.
9. **Omnivore:** Eat plants and animals
10. **Food chain:** Shows how energy is passed between organisms
11. **Food web:** Shows all the feeding relationships within a community
12. **Competition:** Organisms fight for survival and compete for food, mate, shelter, water to survive.
13. **Extremophile:** organisms that live in extreme conditions and are adapted to do so (e.g. very hot or cold temperatures)

Predator–prey cycle

○ Predator and prey population sizes follow a cycle. What happens if the prey population **increases**?

normal prey population

prey population increases

prey population increases

predator population increases as more food

prey population decreases because of more predators

predator population decreases as less food

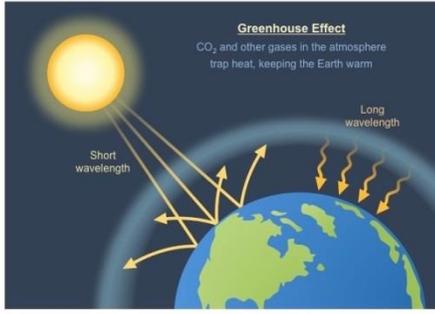| Plants compete for:	Animals compete for:
• Light for photosynthesis • Water for photosynthesis • Nutrients (minerals) for growth • Space for leaves and for roots	• Mates • Food for growth • Territory

Global warming
- Methane, carbon dioxide and water vapour contribute to global warming – these gases stop heat from escaping the Earth, causing the climate to get hotter

Greenhouse Effect
CO_2 and other gases in the atmosphere trap heat, keeping the Earth warm

Short wavelength

Long wavelength

Ways CO_2 is taken OUT of the atmosphere	Ways CO_2 is put INTO of the atmosphere
Photosynthesis	Plant respiration
Dissolving in oceans	Plant burning
Stored in animals through eating	Animal respiration
Stored in fossil fuels when animals + plants die	Decomposers respiring dead stuff and waste
	Combustion of fossil fuels

Deforestation
- Humans are cutting down trees to clear land for farming, building or to collect wood for use as fuel or building material

The Impact
- Forest habitats are destroyed – so biodiversity is decreased
- Soil is eroded
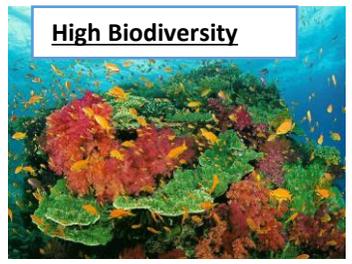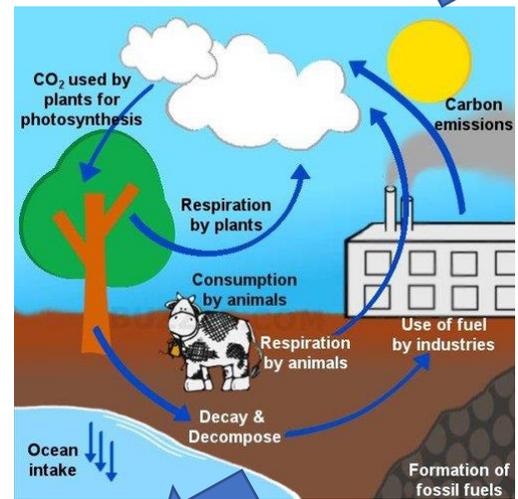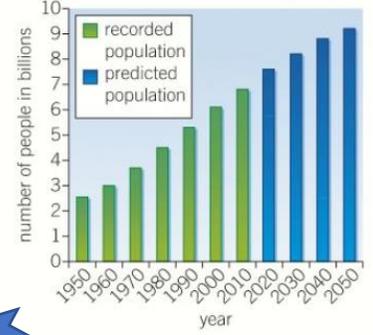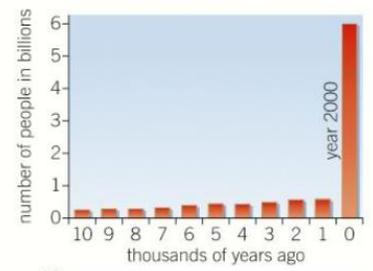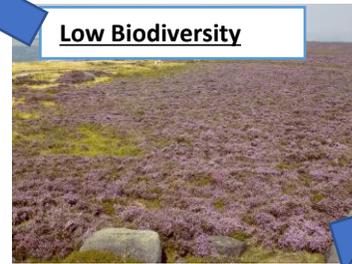- Pollution in the atmosphere is increased as there are less trees to take in carbon dioxide

Biodiversity: The number of different organisms in an ecosystem.

How scientists are increasing biodiversity:
- Breeding endangered species
- Protecting and regenerating rare habitats
- Reintroducing field margins and hedgerows in agricultural areas
- Reducing deforestation and carbon dioxide emissions
- Recycling resources

High Biodiversity

Low Biodiversity

number of people in billions

year 2000

thousands of years ago

recorded population
predicted population

number of people in billions

year

CO_2 used by plants for photosynthesis

Carbon emissions

Respiration by plants

Consumption by animals

Respiration by animals

Use of fuel by industries

Decay & Decompose

Ocean intake

Formation of fossil fuels

The human population is going up, more rapidly in the last 16 years.

This is because people are living longer and less people are dying in childhood due to better standards of living and medicine.

Why maintaining biodiversity is so important:
1) Having lots of different organisms looks scenic
2) Different organisms may provide future medicines or food
3) Different organisms may be useful for building resources

# Sampling an ecosystem

Rules for sampling a field or wood:

1. Place a quadrat **randomly** within the area (to prevent bias)
2. A quadrat is split into squares each square represents an overall percentage of the full square
3. A quadrat with 25 square would mean each square was worth 4%
4. You count a square if the plant takes up half of the square
5. Add up the number of squares to tell you the estimated percentage cover for that species
6. Collect multiple random sample readings to calculate a mean – **quantitative sampling**

Count

Don't count
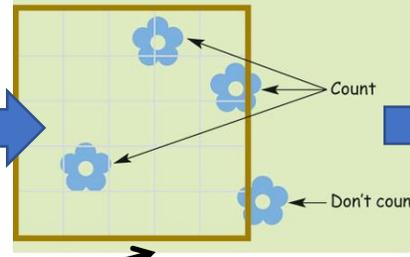
Estimating percentage cover using a quadrat, in the quadrat there are 25 squares, so each square is worth 4%. We would count 3 squares, so 3 x 4% = 12% percentage cover.

Quadrat number	1	2	3	4	5	6	7	8	9
Percentage cover (%)	40	50	30	20	60	70	50	50	40

When to use a Line Transect:

If you want to see how the distribution of organisms changes over a changing ecosystem e.g. from the sea to the sand dunes we would use a line transect

For this information we can calculate:
1) Mean
2) Mode
3) Median

1) Mean = add them all up and divide by the total number of quadrats

1) Mean = (40 + 50 + 30 + 20 + 60 + 70 + 50 + 50 + 40) / 9
= 45.6%

2) Mode = the most common number

2) Mode = 50%

How to use a line transect:

1. Place a tape measure from the start of the area to end of the area
2. Place a quadrat at **regular** intervals along the tape measure e.g. every 10m
3. Estimate the percentage cover of the quadrat and record the results in a table

3) Median = put them in order and the number in the middle is the medium

3) Median = 20, 30, 40, 40, **50**, 50, 50, 60, 70
= 50%

Year 7 Ecology Questions

1. What is an adaptation?
2. State adaptations of animals
3. For each adaptation, explain how it helps the animal to survive.
4. State adaptations of plants.
5. For each adaptation, explain how it helps the plant to survive.
6. What is an abiotic factor?
7. List some abiotic factors.
8. What is a biotic factor?
9. List some biotic factors.
10. What is a habitat?
11. What is a community?
12. What is a population?
13. What is an ecosystem?
14. What is a producer?
15. What is a consumer?
16. Where do producers get their energy from?
17. What is a food chain?
18. Draw 3 examples of food chains.
19. What is a food web?
20. Give an example of a food web.
21. What is a herbivore?
22. Give examples of herbivores.
23. What is a carnivore?
24. Give examples of carnivores.
25. What is an omnivore?
26. Give examples of omnivores.
27. What is a predator?
28. What is meant by prey?
29. Draw a sketch graph to show the relationship between predators and prey.
30. What is meant by competition?
31. What do organisms compete over?
32. What is a quadrat?
33. What is a transect?
34. Describe how to use quadrats and transects to do random sampling.
35. What is deforestation and what is the impact of it?
36. Why does deforestation cause an increase in CO_2 levels?
37. Which three gases are involved in global warming?
38. What is global warming?
39. Describe what is meant by biodiversity
40. Why do scientists want to maintain biodiversity?
41. List 3 ways that scientists are trying to maintain biodiversity