

Biology 7: Ecology

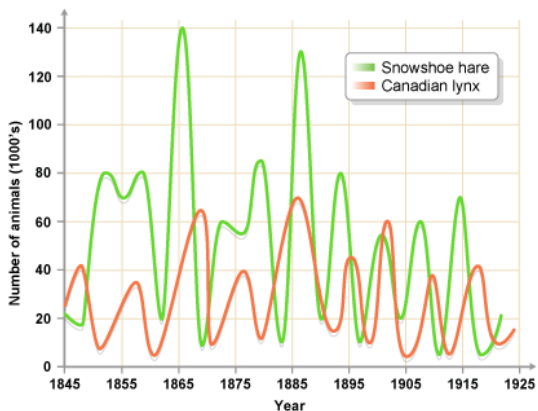
Section 1: Key terms

1 Ecosystem	The interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of their environment.
2 Habitat	The area in which an organism lives .
3 Community	Two or more different species in an ecosystem. A stable community is one where all the species and environmental factors are in balance so that population sizes remain fairly constant .
4 Population	The total number of organisms of one species in an ecosystem.
5 Competition	Plants often compete for light, space, water and mineral ions . Animals often compete for food, mates and territory
6 Interdependence	Within a community each species depends on other species for food, shelter, pollination etc.
7 Adaptations	A feature that an organism has that allows it to survive in its ecosystem.
8 Biodiversity	The variety of all the different species of organisms on Earth , or within an ecosystem .

Section 3: Food Chains and Predator-Prey Relationships



- 11 Producer** – Start of a food chain. Produces **glucose** through **photosynthesis**.
- 12 Primary Consumer** – Eats a **producer**. **Prey** of secondary consumer.
- 13 Secondary Consumer** – Eats a **primary consumer**. **Predator** of primary consumer.
- 14 Tertiary Consumer** – **Predates** on **secondary consumer**.



Predator-prey cycles

- 15** The population of the **prey increases**
- 16** **More food** is available for the **predators**, so their population increases.
- 17** There are **more predators** so the **population of the prey decreases**.
- 18** There is **less prey to feed on** so the population of **predators decreases**.
- 19** The **cycle restarts** from the beginning.

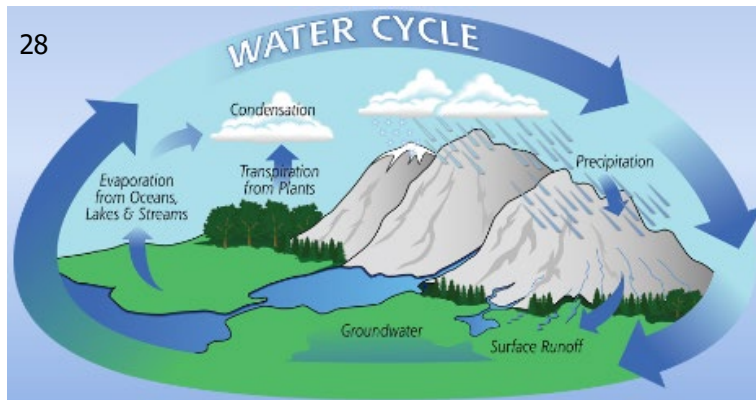
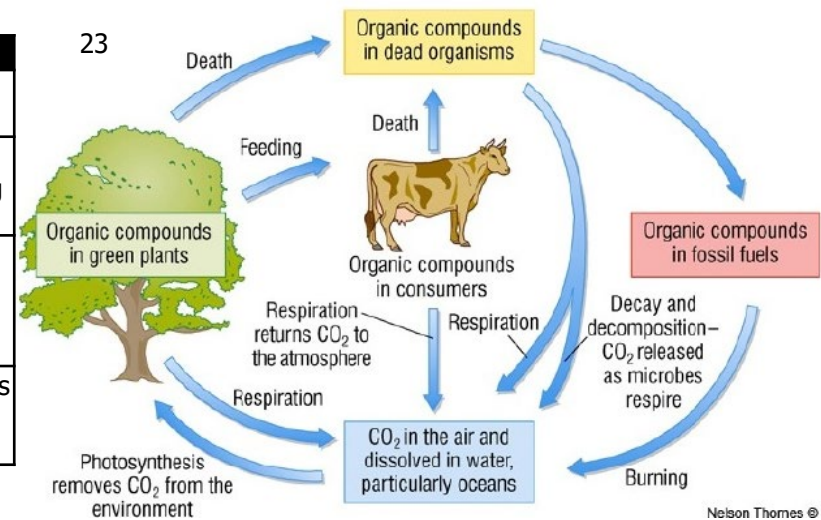
Section 2: Biotic and Abiotic Factors

9 Biotic	10 Abiotic
Availability of food	Light intensity
New predators arriving	Temperature
New pathogens	Moisture levels
One species outcompeting another	Oxygen levels for aquatic animals
	Wind intensity and direction
	Carbon dioxide levels for plants
	Soil pH and mineral content

Section 5: Cycles

Section 5a: Carbon cycle steps

24 Photosynthesis	Plants absorb CO₂ from atmosphere.
25 Respiration	Animals, plants and micro-organisms respire, releasing CO₂ into the atmosphere.
26 Decay	The carbon in dead organisms is released to the atmosphere by micro-organisms respiring .
27 Combustion	Carbon locked in fossil fuels is released as CO ₂ when fuels are burned .



Section 4: Adaptations

20 Structural Adaptations	Part of the body that helps the organism survive. e.g. polar bears have a thick layer of fat for insulation.
21 Functional Adaptations	How the body operates that helps the organism survive. E.g. camels do not sweat.
22 Behavioural Adaptations	A behaviour that helps the organism survive. e.g. desert rats stay in their burrows during the hottest parts of the day.

Section 5b: Water cycle steps

29 Evaporation	Liquid water is turned into water vapour in the atmosphere .
30 Condensation	Water vapour condenses to form clouds .
31 Precipitation	Water is deposited from clouds as rain .

Section 6: Human effects on biodiversity		
Human activity	Why it happens	Effects
32 Polluting water with fertiliser and sewage	Farmers spread fertiliser on fields. Rain washes fertiliser into rivers and ponds. Sewage is released directly into rivers.	Fertilisers and sewage cause an increase in growth of algae . When the algae die , they are decomposed by bacteria that use oxygen . Other animals die due to a lack of oxygen .
33 Using land	Humans construct buildings , create quarries and farm .	Habitat for plants and animals is reduced .
34 Destroying peat bogs	Humans use peat to provide compost to increase food production.	Removes habitat, reducing biodiversity . Decay or burning of peat produces CO₂ .
35 Deforestation	To provide land for cattle and rice fields . To grow crops for biofuels .	Burning or decomposing trees releases CO₂ . Fewer trees to remove CO₂ from the atmosphere . Loss of biodiversity .
36 Producing acidic gases	Combustion of fossil fuels releases carbon dioxide, sulfur dioxide and nitrogen oxides . These gases dissolve in water making it acidic .	Acid rain. Damages plants . Can cause rivers and lakes to become acidic, killing animals and plants.
37 Polluting water with toxic chemicals	Pesticides and other toxic chemicals (e.g. from landfill) are washed into rivers and lakes by rain .	Toxic chemicals accumulate in animals. The further up the food chain , the greater the accumulation . Top predators die or fail to breed.
38 Increasing temperature of the planet (global warming)	Humans release extra greenhouse gases (CO₂ and methane) into the atmosphere and less CO₂ is absorbed by plants through photosynthesis. Greenhouse gases absorb heat and stop it escaping to space.	Loss of habitat as sea levels rise ; animals and plants can no longer survive in certain areas; reduced biodiversity ; change in migration patterns of animals.

Section 7: Maintaining biodiversity
39 Breeding programmes for endangered species.
40 Protection and regeneration of rare habitats.
41 Reintroduction of field margins and hedgerows in agricultural areas where farmers grow only one type of crop
42 Reduction of deforestation
43 Reduction of carbon dioxide emissions by some governments
44 Recycling resources rather than dumping waste in landfill.

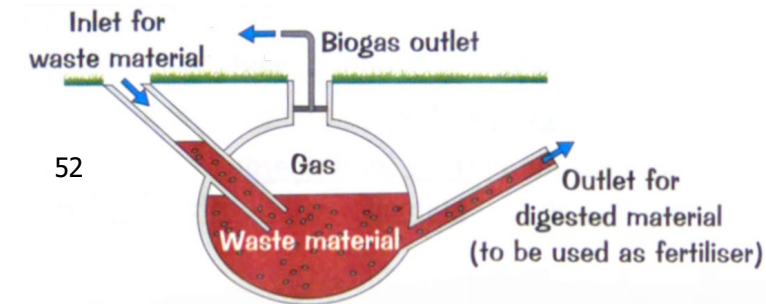
Section 8: Measuring biodiversity		
	Random Sampling	Systematic Sampling (transect)
45 Purpose	Estimate the size of a population in an area.	See how populations and communities change over a distance .
46 Method	<ol style="list-style-type: none"> Choose a suitable number of quadrats to use. Assign co-ordinates to the area that you are sampling. Randomly choose co-ordinates. Place the quadrats and count organisms present. Calculate the mean number of organisms. 	<ol style="list-style-type: none"> Use a tape measure to create a long line (transect). Put quadrats at set distances. Count organisms present. Repeat in a different place/ different time of year. Draw graphs to see how communities change over a distance.



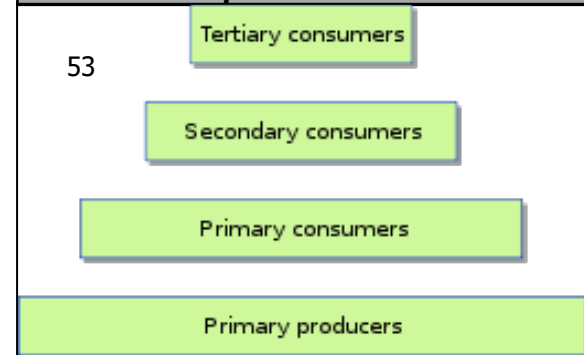
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Section 9: Decay

47 Compost	Decomposed organics matter
48 Decomposition	The breakdown of organic matter by microbes (bacteria/fungi) or detritus feeders (worms)
49 Conditions for decay	Warm, plenty of oxygen, moisture, plenty of microbes
50 Biogas	Methane gas produced by anaerobic decay of waste material, methane is used as a fuel for cooking, heating
51 Biogas generator	Need constant temperature. 2 types: batch and continuous

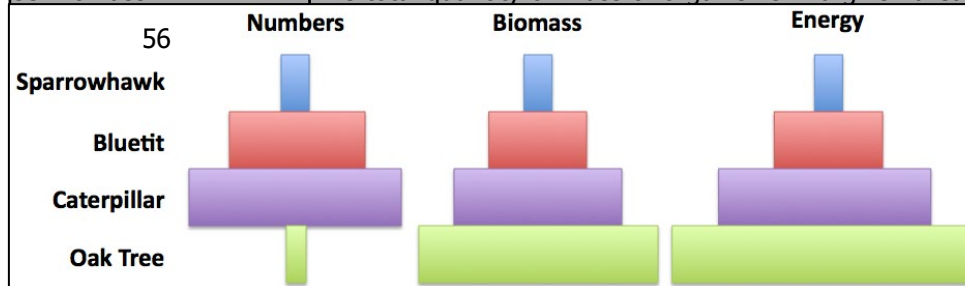


Section 10: Tropic levels



Section 11: Pyramids of biomass

54 Pyramids of biomass	Show the relative mass of each trophic level, must be drawn to scale
55 Biomass	The total quantity or mass of organisms in a given area or volume



Organism	Biomass, dry mass (g)
Oak tree	100 000
Caterpillar	5000
Blue tit	30
Sparrow hawk	3

Section 12: Transfer of biomass

57	the amount of energy (in the biomass of organisms) is reduced at each successive stage in a food chain
58	all of prey organism is not consumed e.g. bones, teeth, hair
59	energy is 'lost' as the organisms' waste materials (faeces and urine)
60	energy is transferred / lost / released during respiration
61	energy is transferred / lost as movement (kinetic energy)
62	energy is transferred / lost as heat (thermal energy)
63	energy is transferred / lost to the surroundings

Section 13: Calculating the efficiency of biomass transfer

64 efficiency = $\frac{\text{biomass transferred to the next level}}{\text{biomass available at the previous level}} \times 100$

65 example from above:
To calculate the % of the energy in the oak tree that is passed to the sparrow hawk here's what to do:
 $3 \div 100\,000 = 0.00003$
 $0.00003 \times 100 = 0.003\%$

Section 14: Food security

66 Food security	Means having enough food to feed the population
67 Threats to food security	World population rising too quickly, demand for certain types of food leads to scarcity, loss of crops in farming through new pests and disease, war over food
68 Fish stocks	Are declining due to over fishing. Fishing quotas and net size help to maintain fish stocks
69 Efficient food production	Intensive farming uses techniques to increase food production e.g. controlled temperature, restricted movement and continual feeding. Although this is controversial
70 Using biotechnology	Mycoprotein is a food made from fungi