Science: Biology 1.4 - Ecosystems

Mathematics involved

$$\text{ESTIMATED POPULATION SIZE} = \frac{\text{TOTAL AREA}}{\text{AREA SAMPLED}} \times \text{TOTAL NUMBER OF DANDELIONS COUNTED}$$

Prior Knowledge:

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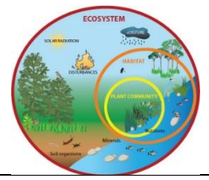
Ecosystems

- Populations - different species
- Communities - all living things that live and interact in an ecosystems
- Habitat = dwelling of a particular organism.



Interdependence

Abiotic Factors – a non-living factor that affects a food chain (temperature, water)
Biotic Factors – a living factor that affects a food chain (predator)
Mutualism – two species benefit from each other
Parasitism – an organism feeds off a host causing harm to the host

Fieldwork Techniques

Belt transect

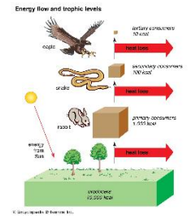
Quadrat –

abundance

Trophic Levels

Transfer of energy through a food chain

Each organism uses up energy and so Energy is lost at each tropic level



Human Impacts

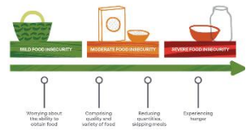
Fish Farming - produce more fish to reduce overfishing of wild fish
Invasive species – introducing new species to an ecosystem that can affect an established food chain
Biodiversity - variety of living things in an ecosystem
Conservation – efforts to protect a rare/endangered species
Reforestation – replant trees to increase habitats

Eutrophication

- High levels of nitrogen containing fertilisers used
- Rain washes fertiliser into rivers and lakes
- Increased nitrogen promotes algae growth on water surface
- Bottom dwelling plants die due to a lack of sunlight
- Bacteria decompose plants, using up oxygen
- Water become anoxic (lack of oxygen)
- Marine life die

Food Security

Increasing human population
Increased meat consumption
Impact of pests and pathogens
Use of land for biofuel production



Carbon Cycle

Processes that take in carbon compounds:

- Photosynthesis – uses CO2 to produce glucose (c6H12O6)

Processes that release carbon compounds:

- Respiration
- Combustion
- Decomposers – bacterial that break down carbon compounds

Processes that lock in carbon compounds

- Ingestion – organisms eat other organisms. Transfer of glucose
- Shells/fossil – lock in carbon compounds

Water Cycle

Processes that occur to move throughout abiotic parts of an ecosystem
Evaporation
Condensation
Accumulation
Potable water – water that is safe to drink
Desalination = obtain freshwater from sea or salty water

Nitrogen Cycle

Denitrification – break down of nitrates into nitrogen gas
Nitrification – conversion of nitrogen into ammonia
Nitrogen fixing – conversion of nitrogen gas into nitrogen compounds
Legumes – plants that have a mutualistic relationship with nitrogen fixing bacteria. Bacteria provides nitrogen compounds to the plant

Indicator Species

A species to assess the level of pollution

Polluted water: blood worm, sludge worm
Clean water: freshwater shrimp, stone fly

Air quality: identification of different lichen species, black spot fungus on roses

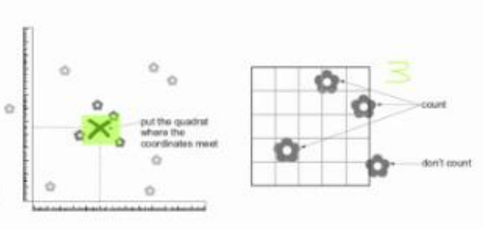
Decay

the rate at which something is broken down
Temperature: warmer temperatures increase rate of decay
Water content: the more water something contains, the quicker the rate of decay
Oxygen levels: the more oxygen there is available, the quicker the rate of decay

Core Practical

Quadrats

1. Measure area and form a grid
2. Take 2 random numbers and use these as coordinates on your grid
3. Lay your quadrat down
4. Count the number of a species and record results



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www.physicsandmathstutor.com