

Ecosystems and material cycles

Communities

Levels of organisation

Organism Population Community Ecosystem

Abiotic factors

Temperature Light Water Pollutants

Biotic factors

Competition Predation

Interdependence

Food Shelter Pollination

Parasitism

Parasite benefits Host harmed

Mutualism

Both benefit Root nodule bacteria

Fieldwork

Quadrats

Random placement Count or percentage cover

Belt transect

Regular intervals Environmental gradient

Measure factors

Light meter Moisture meter

Estimate population

Mean per quadrat Scale up to area

Reliability

Many quadrats Mean

Energy transfer Triple only

Energy lost Triple only

Heat (respiration) Movement Waste Uneaten parts

Fewer organisms higher up Triple only

Short food chains Triple only

Pyramid of biomass Triple only

Wide base Narrows upward

Efficiency Triple only

Transferred ÷ available × 100

Human impacts

Fish farming

Food supply Waste pollution Disease spread

Non-indigenous species

Out-compete natives Reduce biodiversity

Eutrophication

Nitrates in Algal bloom Oxygen falls Fish die

Benefits of biodiversity

Stable ecosystems Food and medicines

Conservation

Protect habitats Captive breeding

Reforestation

Habitats Absorbs CO₂ Less erosion

Food security Triple only

Population Meat and fish Pests Biofuels

Material cycles

Cycling of materials

Abiotic to biotic Decomposers return

Carbon cycle

Photosynthesis Respiration Decay Combustion

Decomposers

Bacteria Fungi

Water cycle

Evaporation Transpiration Condensation Precipitation

Potable water

Safe to drink Desalination

Nitrogen cycle

Nitrogen fixation Nitrification Denitrification Decay

Replacing nitrates

Fertilisers Crop rotation

Indicators and decay Triple only

Polluted water species Triple only Higher tier

Bloodworm Sludgeworm

Clean water species Triple only Higher tier

Freshwater shrimp Stonefly

Air quality species Triple only Higher tier

Lichens Blackspot on roses

Food preservation Triple only

Cold Dry Less oxygen

Composting Triple only

Warm Moist Oxygen

Rate of decay Triple only

Change in mass ÷ time Percentage loss