1.2.1 Ecosystems - Feature of Ecosystems

ecosystem	- a unit that includes all *biotic* components (e.g. plants & animals) and *abiotic* components (e.g. soil & climate in an area)

· the organisms in ecosystems can be classed as *producers*, *consumers*, or *decomposers*

· **producer**	- an organism that uses sunlight energy to produce food
· **consumer**	- an organism that gets its energy by eating other organisms - producers or other consumers
· **decomposer**	- an organism that gets its energy by breaking down material, e.g. dead producers (e.g. fallen leaves) & dead consumers (e.g. animal remains) ; e.g. bacteria & fungi

When dead material is decomposed, nutrients are released into the soil. The nutrients are then taken up from the soil by plants. The plants may be eaten by consumers. When the plants or consumers die, the nutrients are returned to the soil.

nutrient cycle	- the interdependence of biomass, litter, soil -> people & ecosystem components are interdependent as well

Components of an ecosystem depend on others, e.g. consumers depend on producers for a source of food or habitat.

interdependence	- the dependence of two/more components of an ecosystem on one another
->	hot dry summer > reduced plant growth > fewer berries for birds in the winter > number of sparrows & thrushes fall > fewer birds for sparrowhawks to hunt so numbers fall
->	hedgrow trimmed > fewer habitats for ladybirds, greenfly & spiders, so numbers fall > sparrows & thrushes have less to eat, so numbers fall > fewer birds for sparrowhawks to hunt so numbers fall

1.2.1 Ecosystems - Feature of Ecosystems (cont)

food webs **producers > primary consumers > secondary consumers > tertiary consumers**

· as you move up the food web, energy is lost at each stage, which means less consumers can be supported
· each consumer in a food chain 'wastes' / 'uses' nearly all energy taken in
· around 90% of energy at each level is lost through life processes

1.2.1 Ecosystems - UK Local Ecosystem

Epping Forest

· an area of deciduous forest in London (east)
- all that remains of a larger forest that colonised England at the end of Ice Age
· ponds & bogs have their own unique species, including 20 types of dragonfly
· for 1000 years, Epping Forest has been managed in various ways,
e.g. royal hunting ground, timber resources, recreation nowadays

Characteristics of Epping Forest Food Web

· large number of native tree species, e.g. oak, elm, ash & beech
· lower shrub layer of holly & hazel at 5m, overlying grassesm bracken, fern & flowering plants -> 177 species of moss & lichen
-> *great diversity of producer species*
· many insect, mammal & bird consumer species -> 9 amphibian & reptile species and 38 bird species
· 700 species of fungi -> important decomposers

How is the ecosystem interdependent?

· most trees are deciduous -> adaptation to UK climate
- trees grow broad green leaves in spring -> maximises photosynthesis in summer
-> sheds leaves in autumn & conserve energy in winter
· by mid-autumn, forest floor covered with thick layers of leaves ; by spring, the litter all disappears (work done by decomposers & detrivores)
-> nutrients stored in leaves now converted to humus in soil, ready to support the new season's plant growth
[production of fruits & berries -> primary consumers]
· coppicing - cuttine back trees to encourage new growth of wood

Explanation of Characteristics of Epping Forest Nutrient Cycle

· the biomass store is large due to the great height of trees & dense undergrowth
· the soil store is large due to plenty of humus
· high flow rates between litter, soil & biomass stores reflect the viogorous cycle of new growth that takes place each year
· the forests also loses a lot of nutrients each year, via leaching, during episodes of heavy rainfall

1.2.1 Ecosystems - Distribution of Ecosystems

How does climate influence the distribution of global ecosystems?

· the most important factor affecting the distribution of the world's biomes
· major influence over what plants grow and what animals live in the area
· the climate of an area is mainly influenced by its location on planet earth
- the closer to the equator, the warmer the climate is
- the further north / south from the equator, the colder the climate is

1.2.1 Ecosystems - Distribution of Ecosystems (cont)

How does Hadley cells influence the distribution of global ecosystems?

· the circulation of air in Hadley cells influences climate as well
· places located on the equator tend to be wetter as *air rises* and condenses to form clouds ;
- tropical rainforests usually found on the equator · places located on the tropics tend to be drier as *air sinks* there ;
- deserts usually found on the tropics

How does local factors influence the distribution of global ecosystems?

· altitude, relief, ocean currents influence the distribution of global ecosystems
· the temperature drop is aprox. -0.5° for every 100m increase in altitude
· mountains cause *relief rainfall* on one side of the range & a rain shadow on the other
· colder currents create *arid* conditions due to *less evaporation* ;
warmer currents *increases evaporation* and therefore *moisture*, resulting in the increased chances of rain

1.2.2 Tropical Rainforests - Characteristics

climate	· the climate is same all year round with no definite seasons · the temperature is generally between 20-28° and only varies by a few degrees over the year · very high rainfall, around 2000m per year ; usually rains in the afternoon everyday
soil	· the soil isn't very fertile as heavy rain washes nutrients away · there are only nutrients at surface due to decayed leaf fall, however this layer is very thin due to fast decay in warm, moist conditions
plants	· most trees are evergreen to take advantage of the continual growing season · really tall trees & dense vegetation cover -> very little sunlight reaches the floor · there are lots of *epiphytes* - plants that grow on other living plants to reach higher positions in order to absorb more sunlight e.g. orchids & ferns
animals	· rainforest ecosystems contain more animal species than any other · e.g. gorillas, jaguars, anacondas, tree frogs & sloths
people	· many indigenous people have adapted to life in rainforests, making a living by hunting, fishing, gathering nuts & berries and growing vegetables in small garden plots

1.2.2 Tropical Rainforests - Deforestation

Causes

population pressure	- as the population in the area increases, trees are cleared to make land for new settlements
mineral extraction	- minerals (e.g. gold & iron ore) are mined and sold to make money
energy development	- building dams to generate hydro-electric power floods large area of forest
commercial logging	- trees are felled for profit and road building
commercial farming	- forest is cleared to make space for cattle grazing, palm oil & soya plantations
subsistence farming	- forest is cleared so farmers can grow food to provide for themselves & families

1.2.2 Tropical Rainforests - Deforestation (cont)

Environmental Impacts	· no roots to bind soil -> soil erosion -> landslides & flooding · no tree canopy to intercept rainfall & no tree roots to absorb water -> more nutrients washed away -> reduces soil fertility · no trees to remove CO2 & burning vegetation releases CO2 -> more CO2 in atmosphere ->adds to greenhouse effect -> worsen climate change
Economic Impacts	· logging, farming, mining creates jobs -> income -> boosts local economy · large amounts of profit made from selling timber, mining and commercial farming · destroys resources that countries depend on, e.g. timber & reduces attractiveness of area to tourists · may destroy livelihood of locals - animals & plants relied on to make living may be lost · pollution of water supplies & increasing dry climates -> water shortages

1.2.2 Tropical Rainforests - Deforestation (cont)

Sustainable Management

selective logging	· only some older trees are felled ; most trees are left standing · this means the overall structure of forest is kept, so that the forest will be able to regenerate to be used in future · *helicopter logging* is used in Sarawak, Malaysia, removing felled trees with helicopters instead of trucks
replanting	· new trees are planted to replace the ones cut down · same types of tree planted to maintain variety · there are laws to make logging companies to replant trees
ecotourism	· ecotourism minimises damage to environment & benefits locals · income in ecotourism for locals (e.g. guides, providing accommodation & transport) -> less employment in logging · country's economy reliant on ecotourism -> more incentive & raise awareness for conservation · e.g. ecotourism = largest source of income in Costa Rica (21%)

1.2.1 Ecosystems - Global Ecosystems

Tundra	· found at high latitudes (above 60° N) in Northern Europe, Canada and Alaska · very cold winters ; brief summers ; little rainfall · hardly any trees - vegetations include mosses, grasses and low shrubs · *permafrost* - a layer of permanently frozen ground
Boreal Forest	· found between 50 - 60° N ; also known as *taiga* · cold & dry winters ; mild & moist summers · *coniferous* trees - evergreen, with needles
Temperate Deciduous Forest	· found mainly in mid-latitudes where there are four distinct seasons · warm summers ; relatively mild winters ; moderate rainfall all year round · deciduous trees lose their leaves in winter to cope with the colder weather
Hot desert	· found between 15 - 35° north & south of the equator where there is little rainfall · very hot during day ; very cold during night · shrubs & cacti are sparsely distributed in the sandy soil

Grassland	· *savannah grasslands* are found between the tropics
	  - distinct dry & wet seasons ; relatively low rainfall ; most vegetation is grasses with few scattered trees
	· *temperate grasslands* are found at higher latitudes
	  - more variation in temperature ; less rainfall ; no trees - just grasses

Tropical Rainforest	· found around the equator between the tropics, where it is hot & wet all year round · area of lush forest, with dense canopies of vegetation forming distinct layers
Polar	· found around the north and south poles · very cold, icy and dry ; not much grows at all · remains dark for several months each year ; very short growing season - two months