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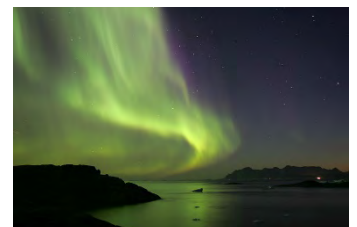
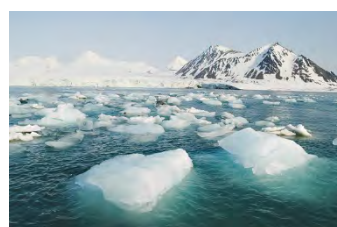
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**WJEC Geography A-level**

**Ecosystems**

**PMT Education**

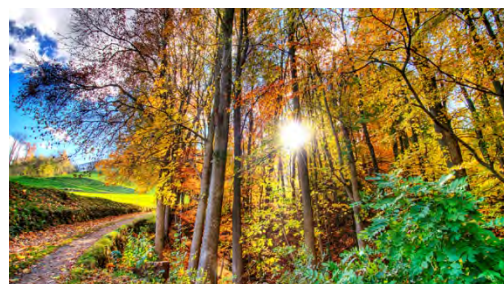
**Written by Jeevan Singh**



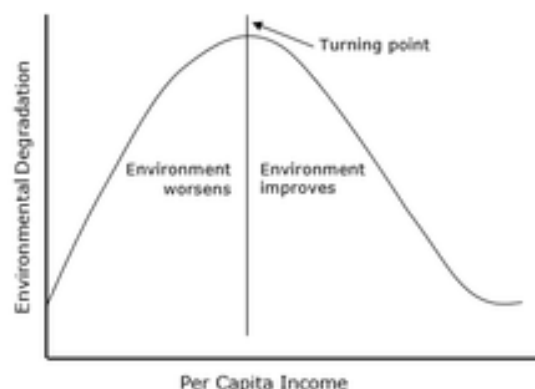
# Ecosystems

## Ecosystems and Sustainability

- Biodiversity provides goods and services, linking to human and ecological wellbeing. Many geologists define biodiversity as the totality of genes, species and ecosystems in an area.
- Biodiversity can be split into:
  - **Genetic Diversity:** Variety within species populations, chromosomes and nucleotides. This determines the degree of resistance to diseases. In agro-ecosystems, breeding new cereal varieties has caused genetic erosion, encouraging disease and impacting food security.
  - **Species Diversity:** Considers kingdoms, phyla, families, individuals and genera. Linked to species richness and number.
  - **Ecosystem Diversity:** Biomes, bioregions, landscapes, niches and habitats are involved.
- Globally, biodiversity richness is greatest in the south of the world. Australia is dry but has rainforest habitats and endemic species.
- Endemic species are those which are specifically adapted to a particular environment. For example, the Canna Mouse is an endemic species adapted to the British Isles environment.
- Generally, animal biodiversity is greater when plant diversity is high as there are more niches for organisms to fill.
- The top five countries in the Biodiversity Index are in or around the Equator and Tropics.
- Tropical rainforests cover 7% of the planet and have over ½ the earth's species. These areas are the most diverse with the greatest number of plant species, supporting insects, birds and mammals.
- Biodiversity **hotspots** are areas which have a rich biodiversity but are threatened with destruction, usually from human activities such as farming and deforestation.
- Hotspots contain huge numbers of species, a large percentage being endemic. Examples include The Atlantic Forest and Fynbos in South Africa.
- Biodiversity has direct values, indirect values and regulating services. They provide food, fuel and medicine along with providing soil formation, food chains, nutrient cycling and environmental stability.
- However, biodiversity is declining due to hunting, industrial pollution, poor conservation, poor farming techniques and disturbance. This will greatly impact human wellbeing, ecosystem process and energy flows.



- Human population and economy growth becomes problematic as it can potentially destroy biodiversity is unsustainable.
- Nonetheless, according to Kuznets curve, as economic development increases, environment management improves. Perhaps this is why developed nations such as the UK are more conscious about their environmental impacts (for example there are regulations on carbon emissions, taxations etc.). As global growth continues to occur, more nations will become wealthier; thus becoming more aware of their environmental footprints.



## Ecosystems and Processes

- An ecosystem is a unit which includes living (e.g. plants) and non-living (e.g. soil) components. It has inputs (such as solar energy), outputs (such as nutrients) trophic levels, food chains and food webs.
- Biomass is the term given to the total quantity or weight of an organism in a given area or volume. Net primary production is the rate at which all the plants in an ecosystem produce useful chemical energy.

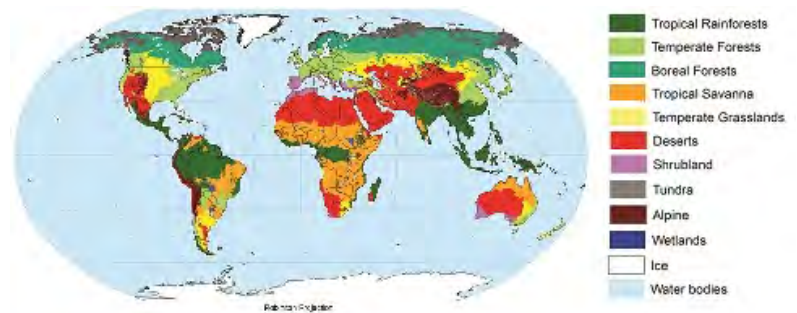


- ➔ Nutrient Cycling is just one process happening in an ecosystem. It works like this:
  - Energy moves in a linear pattern whilst nutrients are recycled - decomposing organisms give minerals back to living matter.
  - Nutrient cycling is faster in warmer climates of the Tropics whilst nitrate fertilisers increase nutrients.
  - When vegetation is removed, it is harder for species to move back as soil nutrients are gone. The soil is also vulnerable to erosion if nutrients are missing.
  
- ➔ Factors influencing the changing of ecosystems include:
  - **Climate Change:** Sea level rise and species migration will mean they are unable to adapt to changing environments. Climate change is both anthropogenic and natural.
  - **Habitat Destruction:** Linked to human overpopulation and economy growth, leading to deforestation and a reduction in biodiversity.
  - **Habitat Fragmentation:** Small pockets of natural systems isolated around human activity.
  - **Overexploitation:** Illegal and institutional systems that exploit unsustainably and use resources without replacing.
  - **Alien Species:** Introduced to where they have few predators, can out compete indigenous species.
  - **Pollution:** Leads to acid rain due to fertiliser use and contamination.
  - **Disease:** Higher population densities will mean that there is a quicker spread of disease. Less food to maintain health.



## Biomes

- ➔ A biome is a large naturally occurring community of flora and fauna occupying a major habitat, such as a forest or tundra. They are identified according to their climate, relief, geology, soils and vegetation.
- ➔ Biomes are identified with patterns of ecological succession and climax vegetation. The global map of biomes shows the British Isles as a zone of Temperate Deciduous Forest. These types of biomes contain trees that lose their leaves and are found across Europe and the USA, having mild and wet weather with a temperate maritime climate. Deciduous trees are thus favoured by the UK's moist maritime climate.



- ➔ Different biomes have different characteristics:
  - **Tropical Forests:** These are found near the equator in Central and South America, parts of Africa and Asia. They are hot and humid and contain almost half of all the world's species. The trees are mainly hardwood and the climate is equatorial.
  - **Savannah:** These tropical grasslands are hot and dry, dominated by grass, scrub and trees. They feature two seasons, dry and rainy, and are found in central Africa, northern Australia and central South America.
  - **Desert:** This is the driest and hottest biome. The world's largest desert is the Sahara.
  - **Mediterranean:** Climates here are neither too hot nor cold. They are found around the Mediterranean Sea, near Cape Town in South Africa and in Australia.

## Marine Ecosystems

- Coral reef systems provide diversity, shoreline protection, food (from fishing), medicine, decoration, construction and provide habitats.
- South East Asia has 30% of the world's coral reefs and 700/1000 coral species.
- Coral reefs are found in shallow seas with temperatures of 18C. They are killed if there is too much sediment from the land.
- Coral systems require salt water and waves to oxygenate. It is illegal to trade corals internationally.
- Human activity is destroying coral systems due to pollution, onshore development, desalination, tourism, fishing and coral reefs being removed.
- Additionally, plastic sediments (from bags and packaging) poison coral reef systems by suffocating them. This is expected to worsen in the future as human development grows.



## Local Ecosystems: New Forest in Hampshire Case Study

- The New Forest is a National Park that covers 375km<sup>2</sup>.
- It is primarily used for timber, timber products, farming and recreation:
  - The New Forest produces around 50 000 tonnes of timber a year.
  - Local mills make fencing products out of the timber.
  - Around 20 million visitors come to the forest every year. Recreation activities include walking, cycling (there are over 100 miles of cycle tracks), wildlife watching, horse riding, fishing, golf, water sports and special events such as the New Forest and Hampshire County Show.
- Ecological development and change have occurred due to urban change and agricultural redevelopment.
- However, the forest is managed so that it is used sustainably:
  - Areas cleared of trees are either replanted or restored to other habitats like heathlands.
  - Walkers and cyclists are encouraged to keep to the footpaths and cycle paths to limit damage done to the surrounding habitats.
  - Dogs are not allowed near the wildlife breeding sites at certain times of the year. These measures help to conserve wildlife so it's still there for future generations.
  - Recreational users are encouraged to act responsibly (e.g. close gates, taken litter home) by information at the National Park Forest Centre and local information points.

