

WJEC (England) Biology A Level
**Topic 1.6: Human Impact on the
Environment**

Notes



Endangered - seriously at risk of extinction. Can be classified via the

Extinct - no remaining individuals of a species are left alive.

An example of classification of endangerment and protection of endangered species is the International Union for Conservation of Nature and the Convention on International Trade in Endangered Species of Wild Flora/Fauna.

The International Union for Conservation of Nature (made up of 200+ governments and 900+ NGOs) draws up a **Red List of Threatened Species** annually. Threatened can be further broken down into vulnerable, endangered and critically endangered. The Convention on International Trade in Endangered Species of Wild Fauna/Flora (CITES) regulates the trade of living organisms and their products by classifying them into three appendices depending on the level of threat to the organism, guided by the Red List:

1. Appendix I = no trade
2. Appendix II = strict controls on trade (and captive populations of organisms in Appendix I)
3. Appendix III = strict controls on trade of certain populations of a species

Potential causes of extinction include:

- Introduction of **new predators** to the environment
- Introduction/evolution of **new diseases**
- Introduction of **new competitors**
- Changes to the environment (e.g. **climate change**)
- A **natural disaster**
- **Speciation**

Gene pools - the alleles present in a population. Species, and therefore gene pools, can be conserved via **in-situ or ex-situ** methods of conservation.

Ex Situ Conservation: conservation **outside of an organism's habitat** e.g. seed banks, e.g.2 captive breeding programmes

Advantages:

- Can be rapid to prevent extinction and maintain genetic diversity
- Can be used for scientific research and education
- Can be used to rapidly increase numbers
- Seed banks take up less room than growing in fields
- The seeds are dormant which reduces chance of damage through pests etc.



Disadvantages:

- Reintroduction can be difficult (the habitat may have evolved without the organism, the organism may be too weak/can't hunt)
- Breeding programmes are expensive and difficult
- Seed banks cannot store every kind of seed
- Seeds don't last forever
- Seeds can be damaged through powercuts etc.
- Can reduce wild populations
- Exploitation of animals

In Situ Conservation: **conservation of whole habitats**/ecosystems e.g. reserves like National Parks, Areas of Specific Scientific Interest. Areas are then monitored and damaging activities are banned.

Sustainability = going about something in a way that minimises damage to the environment e.g. Sustainable Forestry replants the trees that are felled and trees to minimise emissions.

Advantages:

- Recover viable populations in their native habitats
- Protects biodiversity
- Protects representative examples of ecosystems

Disadvantages:

- Risks dramatic decrease in genetic diversity if unsuccessful/not rapid enough
- May not remove the problem e.g. disease

There are issues surrounding agricultural exploitation due to **conflicts between conservation and production**. However, there is a need to **balance maintenance of the ecosystem with the financial and food needs of the population**. These conflicts can be illustrated via deforestation and overfishing:

Overfishing is a problem:

1. The global fishing fleet is too large.
2. Techniques like use of factory ships, bottom trawling, using very small mesh sizes and drift nets indiscriminately remove all species.
3. Fishing through breeding seasons doesn't allow populations to repopulate.

This can be controlled via various means:

1. Not fishing through breeding season.
2. Restricting mesh sizes (and using other less damaging methods).
3. Not fishing endangered species.
4. Quotas.



5. Aquaculture (although this is not carbon neutral and often uses fish as a food source).

Deforestation can be done sustainably by replacing all trees that are felled.

These issues, as well as other human pressures on the environment such as climate change and maintenance of biodiversity, have increased due to **increase in population and consumption of resources**. For sustainability to be achieved, changes in **human attitudes, and the provision of education** so people can make informed choices, are crucial. Similarly, **political decision making** should be informed by **knowledge based on sound scientific principles**.

Progress on these issues can be quantified using the concept of **planetary boundaries**. Planetary boundaries are **ranges of safe operating levels on nine metrics** involved in driving global environmental change. These limits were proposed in 2009 by a group of scientists to define a 'safe operating space' on these metrics to prevent disastrous global environmental change.

These metrics are:

- Climate change
- Biodiversity loss
- Nitrogen cycle
- Phosphorus
- Land use
- Freshwater
- Ozone depletion
- Atmospheric aerosols
- Chemical pollution

