

Conservation

Revision notes · Sustainable resources, why species become endangered, and how forests, fish stocks and endangered species are conserved.

For Cambridge IGCSE Biology 0610 (and 0970, which has the same content). **Supplement** is Extended content, only examined on Papers 2 and 4.

Conservation Spec 20.4

Sustainable resources: forests and fish stocks Spec 20.4.1, 20.4.2, 20.4.5, 20.4.6

Sustainable resource A resource which is produced as rapidly as it is removed from the environment so that it does not run out.

Some resources can be conserved and **managed sustainably**. Two examples are **forests** and **fish stocks**.

Supplement

Conserving forests

Supplement

Conserving forests

Method	How it helps
Education	People learn why forests matter, so they use wood carefully and support protection
Protected areas	Laws stop trees being felled in national parks and reserves, so habitats and species are kept
Quotas	Limits on how many trees can be cut, so wood is removed no faster than it grows back
Replanting	New trees are planted to replace those felled, so forest cover is maintained

Supplement

Conserving fish stocks

Supplement

Conserving fish stocks

Method	How it helps
Education	Fishers and consumers learn about overfishing and choose sustainable fish
Closed seasons	Fishing is banned during the breeding season, so fish can reproduce
Protected areas	Fishing is banned in some areas so populations can recover
Controlled net types and mesh size	Larger mesh lets young fish escape, so they can grow and breed; nets that catch other species by accident are banned
Quotas	Limits on the mass or number of fish that can be caught, so they are not removed faster than they reproduce
Monitoring	Fish populations are counted regularly so that quotas can be adjusted

Supplement

Exam tip: Say how each method helps: 'larger mesh size lets young fish escape so they can breed later', not just 'larger mesh size'.

Endangered species and how to conserve them Spec 20.4.3, 20.4.4, 20.4.8

An **endangered** species is at risk of dying out. A species is **extinct** when no individuals are left alive anywhere.

Why organisms become endangered or extinct

Causes of endangerment and extinction

Cause	Explanation
Climate change	Habitats change too quickly for species to adapt or move
Habitat destruction	Loss of food, shelter and breeding sites
Hunting	Animals are killed for meat, fur, horns or tusks faster than they reproduce
Overharvesting	Plants or animals are collected or caught faster than they can be replaced
Pollution	Poisons or waste make habitats unsuitable or kill organisms
Introduced species	A non-native species may compete with, prey on or spread disease to native species

How endangered species can be conserved

- **Monitoring and protecting species and habitats:** populations are counted, and reserves and laws protect the animals and their habitats.
- **Education:** people are taught why species matter, so they support conservation.
- **Captive breeding programmes:** animals are bred in zoos and reserves, and young may be released into the wild.
- **Seed banks:** seeds of rare plants are stored at low temperature so that plants can be grown later if the wild population dies out.

Supplement

Artificial insemination and IVF in captive breeding

Supplement

- **Artificial insemination (AI):** sperm is collected from a male and placed into the female by a technician. It allows breeding between animals in different zoos without moving them, and helps animals that will not mate naturally.
- **In vitro fertilisation (IVF):** eggs are fertilised by sperm outside the body in a laboratory. The embryos are placed into the female, or into a surrogate female, to develop. This produces more offspring than natural mating.
- With both methods, conservationists can choose parents that are not closely related, which helps to keep genetic variation in the captive population.

Common mistake: Captive breeding programmes alone do not save a species. The habitat must also be protected so that the animals can be released.

Reasons for conservation programmes Spec 20.4.7, 20.4.9 Supplement

Reasons for conservation programmes

- **Maintaining or increasing biodiversity**, so that there are many species in an area.
- **Reducing extinction**, because extinction is permanent.
- **Protecting vulnerable ecosystems**, such as rainforests and coral reefs, which are easily damaged.
- **Maintaining ecosystem functions:** **nutrient cycling** and **resource provision**, including food, drugs, fuel and genes.

Nutrient cycling relies on decomposers and a variety of organisms. Resource provision means ecosystems supply food, medicines (drugs from plants), fuel such as wood, and genes in wild species that may be useful for breeding crop plants and livestock or for genetic engineering.

Risks of reduced population size

When the population of a species decreases, **genetic variation** is reduced because there are fewer different alleles in the population. This brings risks:

- Fewer individuals have alleles that give resistance to a new disease, so the disease can kill most or all of the population.
- If the environment changes, there may be no individuals with features suited to the new conditions, so the species is less able to adapt and survive.
- Related individuals are more likely to breed together, which can increase inherited disorders.

Exam tip: Link the small population to the loss of variation, then to what happens when the environment changes or disease arrives. Genetic drift is not required.

Quick check

1. Define a sustainable resource.
2. Give four reasons why species become endangered or extinct.
3. What is a seed bank?
4. **Supplement** Why does a small population have a greater risk of dying out?
5. **Supplement** Why does a larger mesh size help conserve fish stocks?

Quick check answers

Conservation

1. One which is produced as rapidly as it is removed from the environment so that it does not run out.
2. Any four of: climate change, habitat destruction, hunting, overharvesting, pollution, introduced species.
3. A store of seeds from rare plants, kept so that the plants can be grown again if wild populations are lost.
4. Less genetic variation, so fewer individuals may survive disease or environmental change.
5. Young fish escape and can grow and breed.