



# Maintaining Biodiversity

- ❑ Outline the reasons for the conservation of animal and plant species.
- ❑ Discuss the consequence of global climate change on the biodiversity of plants and animals.
- ❑ Explain the benefits for agriculture of maintaining the biodiversity of animal and plant species.
- ❑ Describe the conservation of endangered plant and animal species, both *in situ* and *ex situ*.
- ❑ Discuss the role of botanic gardens in the *ex situ* conservation of rare plant species, or plant species extinct in the wild.
- ❑ Discuss the importance of international cooperation in species conservation.
- ❑ Discuss the significance of environmental impact assessments (including biodiversity estimates) for local authority planning decisions.



# Why is conservation necessary?

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- ❑ Human populations have increased in size.
- ❑ Humans are using more and more of the Earth's resources.
- ❑ Human activities destroy habitats and harm other species, either directly or indirectly.
- ❑ This leads to a loss of biodiversity and even extinction of species.



# Reasons for conservation

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- Economic and ecological reasons
  - To solve technical problems
  - For food
  - To remove CO<sub>2</sub> and produce O<sub>2</sub>
  - Recycle nutrients
  
- Ethical and aesthetic reasons
  - All living things have the right to survive and to live in the way they have become adapted
  - Living things contribute to the mental welfare of people and bring joy



# Effect of global climate change

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- ❑ Genetic diversity is important for a species to be able to evolve and adapt to new conditions.
  
- ❑ Migration of populations will be necessary. Barriers to migration are
  - major human developments
  - agricultural land
  - large bodies of water
  - humans





# Agriculture and climate change

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- Benefits – more yield due to
  - raised CO<sub>2</sub> levels increasing photosynthesis
  - raised temperatures increasing growth rates
  - longer growing seasons
  - increased rain (due to increased evaporation)
  
- Drawbacks – reduced yield due to
  - a change in the pattern of rainfall
  - loss of land due to raised sea levels and increasing salinity of soils
  - due to traditional crop varieties not being adapted to the new conditions
  - New/increased occurrence of diseases and pests of crops



# Conservation *in situ*

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= conserving a species in its normal environment

- Legislation
  - can be difficult to enforce
  - some countries do not agree that legislation is necessary
  
- Set up conservation parks/reserves – e.g. under the management of Natural England. The UK has
  - 14 National Parks
  - over 200 National Nature Reserves
  - over 6000 Sites of Special Scientific Interest (SSSI)
  - many Local Nature Reserves
  
- Land management on farms and private land
  - maintaining habitats
  - restoring habitats so that natural repopulation can occur.



# Conservation *ex situ*

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= conserving an endangered species by activities that take place outside its normal environment.

□ Animals - captive breeding programmes.

Expensive and full of difficulties, due to

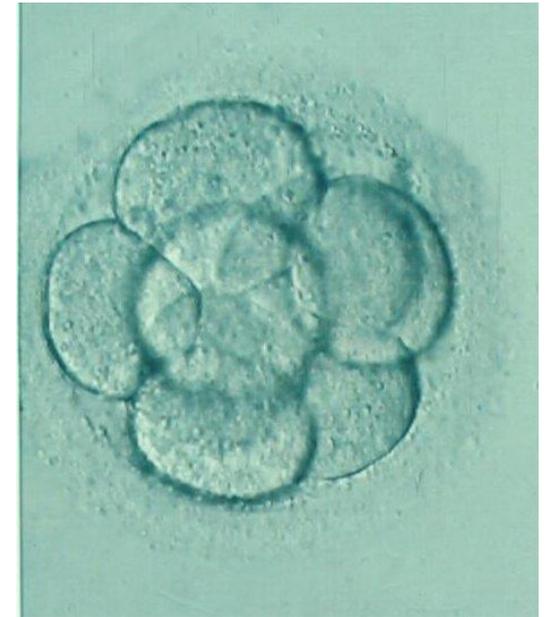
- Animals do not breed because they are not in their natural environment
- Limited genetic diversity due to few individuals means that the species cannot adapt to changing conditions
- Reintroduction to the wild may be unsuccessful due to the need to find food and avoid predation or to integrate into wild populations



## □ Animals - captive breeding programmes

Modern techniques that can be used to preserve genetic diversity are:

- Sperm freezing, artificial insemination, *in vitro* fertilisation and embryo-transfer techniques
- Research into species-specific reproductive physiology
- Researching/practising techniques on domesticated species that are similar to the endangered species allows the endangered species to benefit from the findings without putting them at risk.





## □ Plants

- Botanical gardens conserve endangered plant species
- Seed banks e.g. Kew Millennium Seed Bank Project store seeds under cold dry conditions. Periodically, a proportion of the seeds are germinated

## □ Advantages

- Relatively easy to propagate
- Plants can be re-planted in the wild or used for research
- Seeds can be collected without damaging plants
- Seeds can be stored in a relatively small space

## □ Disadvantages

- Seed samples may have low genetic diversity
- Seeds become less viable during storage



# International cooperation

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## ■ CITES

- Convention on International Trade in Endangered Species of Wild Fauna and Flora
- First agreed in 1973
- Over 25 000 species have been identified as at risk
- Aims to regulate and monitor international trade in selected plants and animals
- International trade policies are difficult to enforce. Smuggling is a problem.



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- Convention on Biological Diversity
    - Signed in 1992 at the Rio Earth Summit

It promotes

- Conservation of biological diversity, including *ex situ* measures
- Sustainable use of biological resources
- Shared access to genetic resources
- Sharing of scientific knowledge
- Sharing of benefits arising out of the use of genetic resources

Every state must undertake an environmental impact assessment (EIA) before any major development