

Option C: Biodiversity in Ecosystems



- What is biodiversity ?
- Why is biodiversity important?
- Where is biodiversity greatest ?

1

Option C: Biodiversity in Ecosystems



Three types of biodiversity

- Species diversity
- Genetic diversity
- Ecosystem (habitat) diversity

2

Option C: Biodiversity in Ecosystems



Species Diversity:

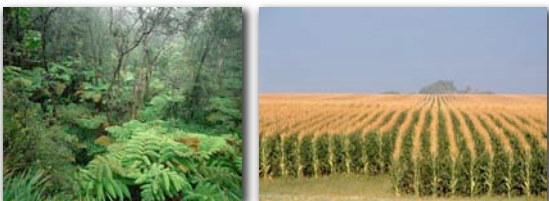
The variety of species per unit area.
This includes both the number of species present and their relative abundance.

3

Option C: Biodiversity in Ecosystems



Species Diversity:



4

Option C: Biodiversity in Ecosystems



Species Diversity:



5

Option C: Biodiversity in Ecosystems



Genetic Diversity:

The range of genetic material present in a gene pool or population of a species. Domestication and plant breeding lead to a loss of genetic variety, hence the importance of “gene banks”

6

Option C: Biodiversity in Ecosystems



Genetic Diversity:

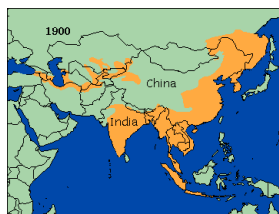


7

Option C: Biodiversity in Ecosystems



Genetic Diversity:

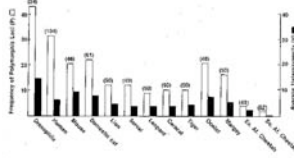


8

Option C: Biodiversity in Ecosystems



Genetic Diversity:



9

Option C: Biodiversity in Ecosystems



Genetic Diversity:

- Problems facing cheetahs:
- Habitat loss and human encroachment
 - Competition with other predators and predation by lions and hyenas in protected areas
 - Continued trapping and killing of cheetahs on farmlands
 - Low genetic variation
 - Abnormal reproductive traits
 - Increased disease susceptibility
 - Poor reproductive performance in captivity



10

Option C: Biodiversity in Ecosystems



Genetic Diversity:

Domestication and plant breeding lead to a loss of genetic variety.



11

Option C: Biodiversity in Ecosystems



Habitat Diversity

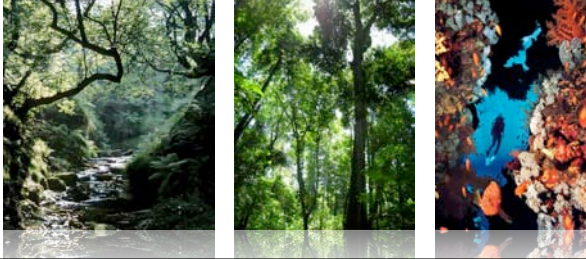
The range of different habitats in an ecosystem, community or biome associated with the variety of niches that may be exploited by different species. Conservation of habitat diversity usually leads to the conservation of species and genetic diversity.

12

Option C: Biodiversity in Ecosystems



Habitat Diversity



13

Option C: Biodiversity in Ecosystems



Habitat Diversity



14

Option C: Biodiversity in Ecosystems



Habitat Diversity



15

Option C: Biodiversity in Ecosystems



Natural selection and new species
Natural selection is the driving force of speciation.

Isolation can lead to different species

16

Option C: Biodiversity in Ecosystems



Natural selection and new species

Darwins Finches

Adaptive radiation in Galapagos finches



17

Option C: Biodiversity in Ecosystems



Natural selection and new species

Darwins Finches



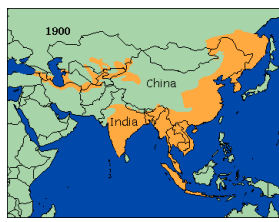
18

Option C: Biodiversity in Ecosystems



Natural selection and new species

An analogy ?



19

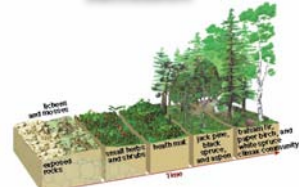
Option C: Biodiversity in Ecosystems



Diversity naturally changes because of?

- Early stages: simple habitat - low diversity
- Later stages: more complexity - higher diversity

Succession



• Why?

20

Option C: Biodiversity in Ecosystems



Diversity naturally changes because of?

- More niche opportunities
- Higher stability
- Higher genetic and species diversity



21

Option C: Biodiversity in Ecosystems



Diversity naturally changes because of?

- More complex nutrient and energy pathways



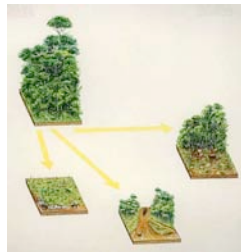
22

Option C: Biodiversity in Ecosystems



Threats to succession = Threats to diversity

- Man



23

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

What factors lead to diversity loss

- Natural hazards



24

Option C: Conservation and Biodiversity

C.2: Evaluating Biodiversity and Vulnerability

What factors lead to diversity loss

- Global Catastrophe



25

Option C: Conservation and Biodiversity

C.2: Evaluating Biodiversity and Vulnerability

What factors lead to diversity loss

- Habitat degradation, fragmentation and loss



26

Option C: Conservation and Biodiversity

C.2: Evaluating Biodiversity and Vulnerability

What factors lead to diversity loss

- Introduction of non-native species, genetically modified species and monocultures



27

Option C: Conservation and Biodiversity

C.2: Evaluating Biodiversity and Vulnerability

What factors lead to diversity loss

- Pollution



28

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

What factors lead to diversity loss

- **Hunting, collecting and harvesting**



29

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

Rainforests their value and vulnerability



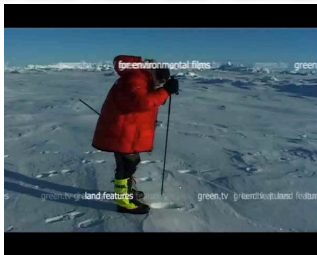
30

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

Rainforests their value and vulnerability



31

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

Loss of biodiversity at a species level leads to:

Extinction



32

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

What makes a species prone to extinction:

- ◆ Small population
- ◆ Specialised habitat
- ◆ Restricted food source
- ◆ Low reproductive potential
- ◆ Accumulation of toxins
- ◆ A prominent predator so killed by farmers
- ◆ Migrates long distances



33

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

What makes a species prone to extinction:

- ◆ Polar bears are large and conspicuous
- ◆ population size is shrinking
- ◆ tasty meat and warm fur
- ◆ huge home range
- ◆ low reproductive potential
- ◆ top of the food chain



34

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

What makes a species prone to extinction: LIVING ON AN ISLAND

- ◆ High degree of endemism
- ◆ Small populations on islands
- ◆ Lower genetic diversity
- ◆ Vulnerable to introduced predators



35

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

What makes a species prone to extinction: LIVING ON AN ISLAND

Does something have to be surrounded by water to be an island?



36

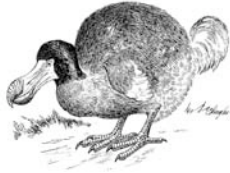
Option C: Conservation and Biodiversity

C.2: Evaluating Biodiversity and Vulnerability



The Dodo

- ◆ Mauritius, Indian Ocean
- ◆ lived undisturbed
- ◆ for so long that it
- ◆ lost its need and ability to fly
- ◆ lived and nested on the ground
- ◆ ate fruits that had fallen from trees
- ◆ no mammals on the island
- ◆ high diversity of bird species lived in the dense forests.



37

Option C: Conservation and Biodiversity

C.2: Evaluating Biodiversity and Vulnerability



The Dodo

- ◆ 1505 Portuguese arrived
- ◆ island became stopover for ships engaged in the spice trade.
- ◆ large dodo was a welcome source of fresh meat for the sailors.



38

Option C: Conservation and Biodiversity

C.2: Evaluating Biodiversity and Vulnerability



The Dodo

- ◆ Later Dutch used island as a penal colony
- ◆ pigs & monkeys brought to the island
- ◆ along with the convicts
- ◆ rats on ships
- ◆ within 100 years the once abundant dodo was rare
- ◆ last one killed in 1681



39

Option C: Conservation and Biodiversity

C.2: Evaluating Biodiversity and Vulnerability



The Dodo

- ◆ Many other bird species were lost in the 19th century
- ◆ Mauritian forests were converted into tea and sugar plantations.
- ◆ Of the 45 bird species originally found on Mauritius, only 21 have managed to survive.



40

Option C: Conservation and Biodiversity

C.2: Evaluating Biodiversity and Vulnerability



Measuring Extinction

Very difficult:



How can we know an organism has gone?

1. First you need to know it was there
2. Then somebody needs to actually care enough to count it

41

Option C: Conservation and Biodiversity

C.2: Evaluating Biodiversity and Vulnerability



Measuring Extinction

Big, showy, visible



Small, discrete, hidden

The “ooooooooohhhh” factor

42

Option C: Conservation and Biodiversity

C.2: Evaluating Biodiversity and Vulnerability



Measuring Extinction

Mammals, Birds even Reptiles are relatively well described



Fish, Amphibians, Invertebrates and even plants are relatively poorly described

43

Option C: Conservation and Biodiversity

C.2: Evaluating Biodiversity and Vulnerability



Extinction Rate

Past extinctions based on mainly fossil evidence:

But has every organism that has existed been fossilised and have fossils been found that definitely cover the entire time that organism existed

44

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

Extinction Rate

Red Data List

Published by the IUCN

Attempts to survey and quantify the state of the planets "at risk" species

Has weaknesses - probably underestimates the problems

45

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

Extinction Rate

Red Data List

Published by the IUCN

Attempts to survey and quantify the state of the planets "at risk" species

Has weaknesses - probably underestimates the problems

46

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

Extinction Rate

Red Data List

Some taxa much better surveyed than others
e.g. mammals quite well surveyed,
arthropods badly surveyed

47

Option C: Conservation and Biodiversity



C.2: Evaluating Biodiversity and Vulnerability

Extinction Rate

Red Data List

Lists a set of criteria by which the endangered status of organisms is defined as a category

A species is listed as threatened if it falls in the Critically Endangered, Endangered or Vulnerable categories

48
