Exercise walk-through

2.5
Zonation, succession and change

International Baccalaureate · IB Diploma · Environmental Systems and Societies · SL

Simpson's reciprocal index

- Site A has 10, 6 and 4 individuals; site B has 18, 1 and 1.
- Same richness, but A is shared more evenly.

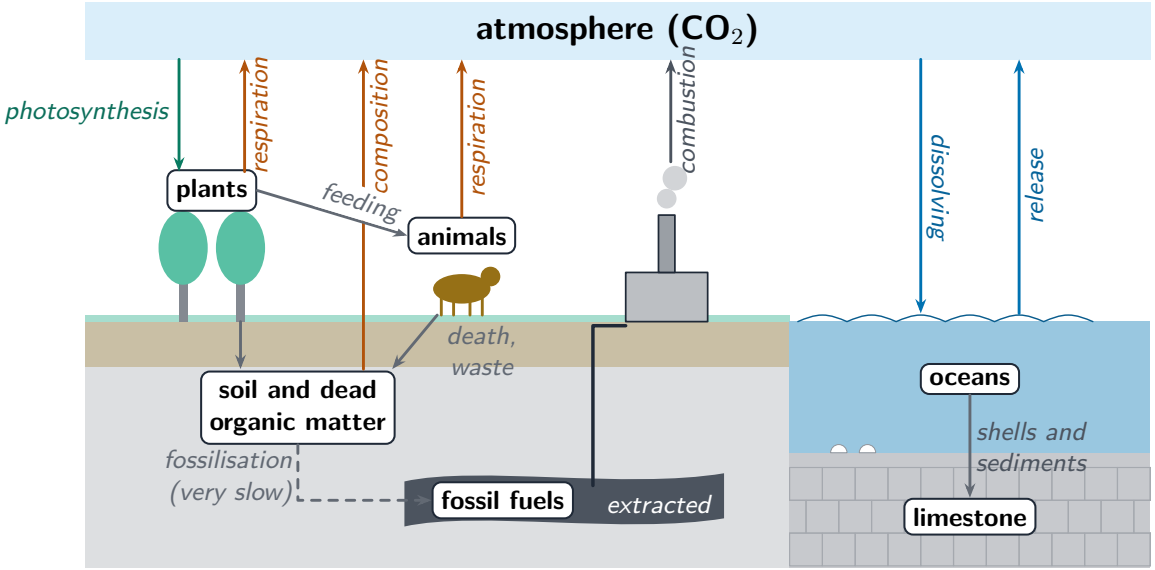
$$D = \frac{N(N-1)}{\sum n(n-1)}$$

$$D_A = \frac{380}{132} = 2.88$$

$$D_B = \frac{380}{306} = 1.24$$

These invented samples have equal richness and different evenness; compare like sampling.

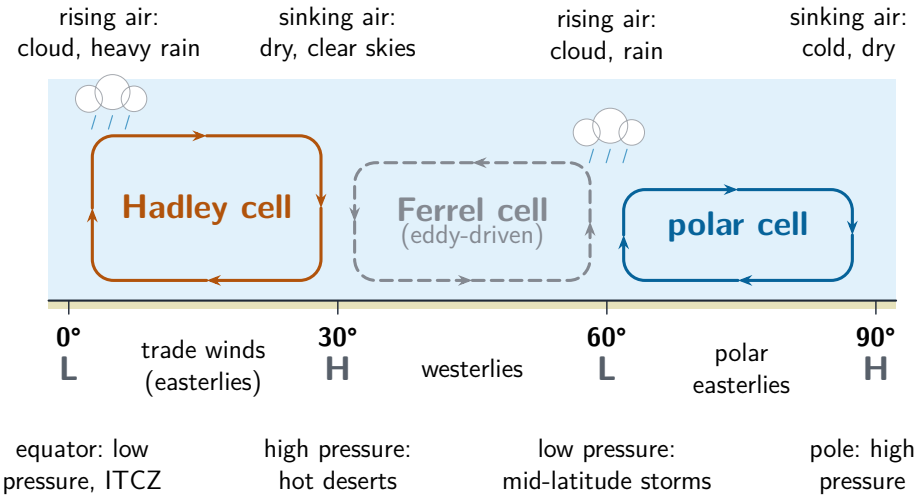
The carbon cycle



storages in boxes, flows on arrows; not to scale

A store is an amount; a net **sink** is defined by the balance of flows over time.

The tricellular model

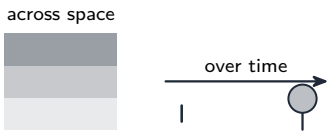


one hemisphere, idealised zonal mean; heights not to scale

Link rising and sinking air to pressure and surface winds.

Exercises 2.1·2.2

2.1 Distinguish between zonation and succession. [2]

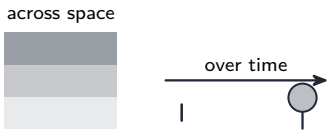


2.2 Describe the stages of primary succession on bare volcanic rock. [3]



Exercises 2.1·2.2

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2.1

zonation: change in communities across space along a gradient; succession: change in the community at one place over time

2.2 Describe the stages of primary succession on bare volcanic rock. [3]



2.2

pioneers such as lichens and mosses colonize bare rock and start weathering it; dead matter and rock particles form a thin soil, so grasses and small plants can grow; deeper soil allows shrubs, then trees, until a climax community forms

Exercise 3.1 (a)

3.1 The table shows changes during succession on abandoned farmland.

years since abandoned	1	10	50	150
number of plant species	12	35	48	40
soil organic matter (%)	1.2	2.5	4.8	6.1

(a) State the type of succession. [1]

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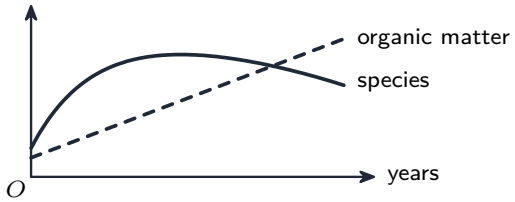
(a) secondary succession (soil already present)

Exercise 3.1 (b)

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(b) Describe the changes in the number of species, and suggest a reason for the change after 50 years. [3]

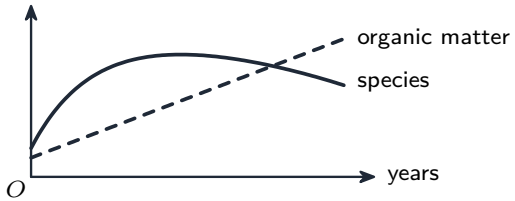


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(b) species rise from 12 to 48 by 50 years, then fall to 40; tall trees shade out smaller plants; a few K-strategist species dominate at climax and out-compete others

Exercise 3.2 (a)

3.2 A dandelion produces thousands of light seeds each year; an oak tree takes 40 years to produce its first acorns.

(a) Classify each as an r- or K-strategist, with a reason. [2]

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(a) dandelion: r-strategist, many small seeds, matures fast; oak: K-strategist, matures late, few large seeds

Exercise 3.2 (b)

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(b) Explain why r-strategists are common in the early stages of succession. [3]



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(b) they reach new, bare or disturbed land quickly, as many seeds spread widely; they grow and reproduce fast while resources are plentiful and competition is low; later they are out-competed by slower, larger K-strategists