

Exercise walk-through

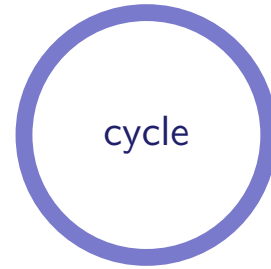
1.11

Food Chains and Food Webs

AP Environmental Science

What we will cover

- 1 Ecosystems and niches
- 2 Biomes
- 3 Biogeochemical cycles
- 4 The water cycle
- 5 Primary productivity
- 6 Energy flow and food webs



Worked example – the 10% rule, level by level

With 12,000 kcal/m²/yr of NPP at the producers, how much reaches the secondary consumers?

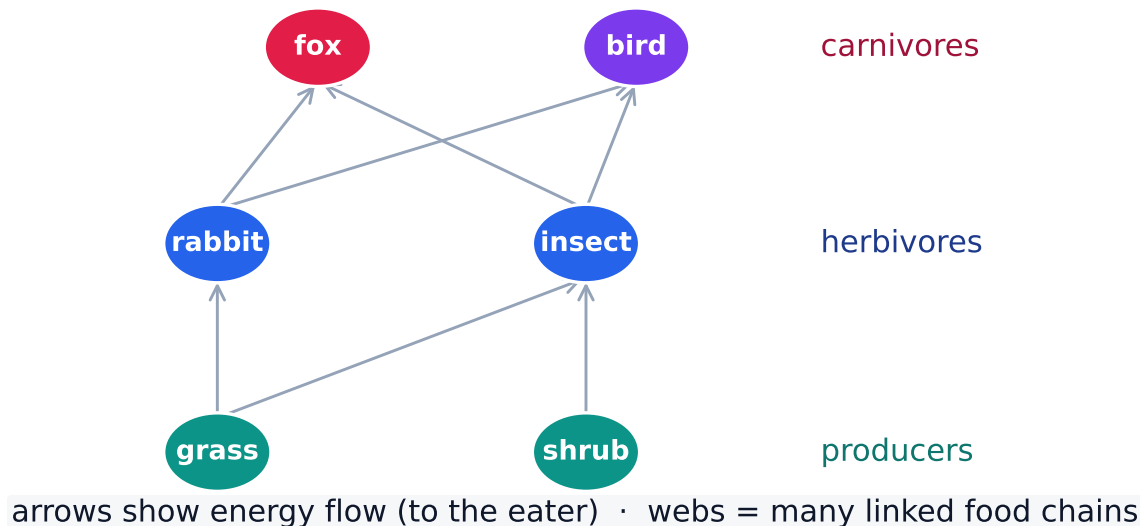
- primary consumers: $10\% \times 12,000 = 1,200$
- secondary consumers:
 $10\% \times 1,200 = 120 \text{ kcal/m}^2/\text{yr}$
- the other 90% leaves as **heat**, waste and unconsumed tissue

Each level keeps about a tenth. That is why food chains are **short** and why eating lower down feeds more people.

Food chains and food webs

A **food chain** is one path; arrows point the way energy flows (food → eater). A **food web** links many chains.

A **keystone species** (sea otter) shapes the whole web; an **indicator species** warns of stress.



Exercises 2.1-2.3

2.1 What is the difference between a food chain and a food web?

[1]

2.2 In a food chain, which way does the arrow point?

[1]

2.3 What is a keystone species?

[1]

Exercises 2.1-2.3

2.1 What is the difference between a food chain and a food web?

[1]

2.1

- A food chain is a single line of feeding; a food web links many chains together
-

2.2 In a food chain, which way does the arrow point?

[1]

2.2

- From the organism eaten to the one that eats it (prey
 - predator)
-

2.3 What is a keystone species?

[1]

2.3

- A species with an outsized role whose removal greatly affects the community

Exercise 3.1

3.1 In a food web, an arrow from a rabbit to a fox shows that

[1]

☐

A the rabbit eats the fox

B energy flows from the rabbit to the fox

C they do not interact

D the fox is a producer

Exercise 3.1

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[1]

☐

A the rabbit eats the fox

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C they do not interact

D the fox is a producer

3.1 B

- energy flows from the rabbit to the fox

Exercise 3.2 (a)

3.2 In a food web, hawks eat both snakes and mice.

(a) Predict what happens to the mouse population if hawks are removed.

[2]

Exercise 3.2 (a)

3.2 In a food web, hawks eat both snakes and mice.

(a) Predict what happens to the mouse population if hawks are removed.

[2]

(a)

- With fewer predators, the mouse population is likely to increase

Exercise 3.2 (b)

3.2 In a food web, hawks eat both snakes and mice.

(b) Explain why a food web is more realistic than a single food chain.

[1]

Exercise 3.2 (b)

3.2 In a food web, hawks eat both snakes and mice.

(b) Explain why a food web is more realistic than a single food chain. [1]

(b)

- Most organisms eat and are eaten by several species, which a web shows but a single chain does not

Exercise 3.3

3.3 Explain why removing a keystone species can have a large effect on a food web. [2]

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3.3

- A keystone species affects many others (e.g. by controlling prey numbers); removing it lets some populations grow and others shrink, changing the whole web