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Ecosystems and Food Webs

This presentation will explore ecosystems and food webs, using an ecosystem that ZSL works with in India as a case study.

How to use:

- Click through the slides one by one.
- Write down your answers to any **QUESTIONS** on a blank piece of paper before clicking through to see the answers at the end.
- Research the answer to any question you're unsure about or words you don't recognise.

Q1. What does ZSL stand for and what do they do?

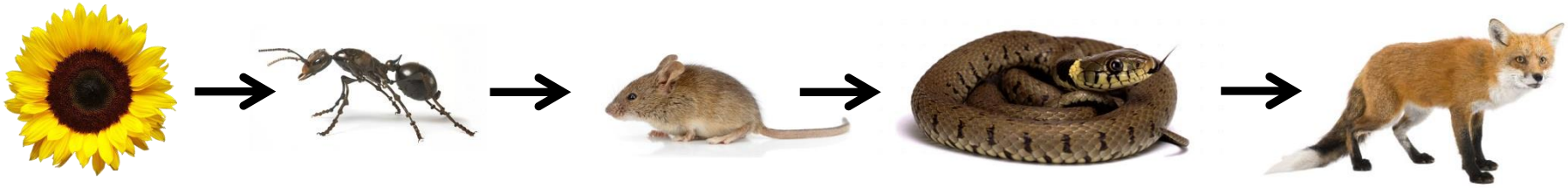
Food Chains

Q2. What is a food chain?

Q3. Put the following native species into a food chain, labelling each level (producer, primary consumer etc...)

NOTE: make sure you put the arrows in the right direction!

Food Chains



Q4. What do the arrows show?

Q5. Can you think of anything that might eat the fox even though it is the apex predator?

Food Chains

Producer

Primary Consumer

Secondary Consumer

Tertiary Consumer

Apex Predator

Scavenger

Food Chain

Scavenger

Apex Predator

Tertiary Consumer

Secondary Consumer

Primary Consumer

Producer

These labels are also known as the **TROPHIC LEVELS** of the food chain.

Each trophic level can be thought of as containing a certain amount of **BIOMASS**

Q6. What is biomass?

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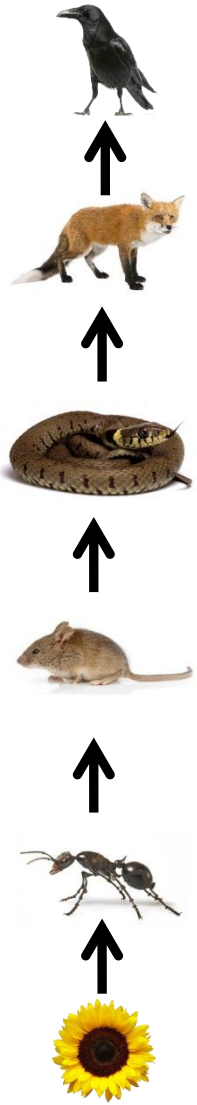
Food Chain



Trophic Levels

- Scavenger
- Apex Predator
- Tertiary Consumer
- Secondary Consumer
- Primary Consumer
- Producer

We can draw modified bar charts to indicate the amount of biomass present at each level, called **pyramids of biomass.**

Q7. Draw a pyramid of biomass for this ecosystem, where the width of each bar represents the amount of biomass present at each level.

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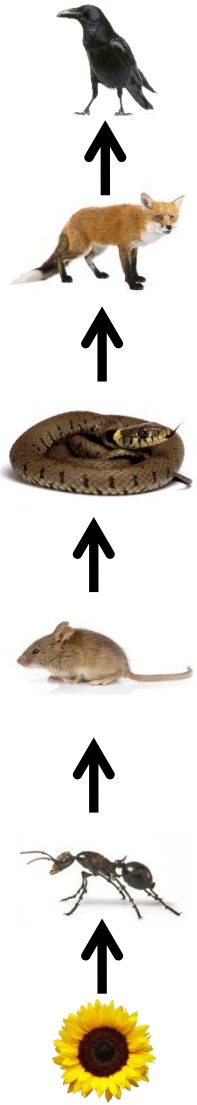
Food Chain



Trophic Levels

- Scavenger
- Apex Predator
- Tertiary Consumer
- Secondary Consumer
- Primary Consumer
- Producer

Pyramid of biomass

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Trophic Levels

Q8. Only 10% of the biomass from each level is transferred up to the next – why?

- Scavenger
- Apex Predator
- Tertiary Consumer
- Secondary Consumer
- Primary Consumer
- Producer

Thus biomass shrinks at every level, meaning food chains are rarely longer than 6 stages.

Pyramid of biomass

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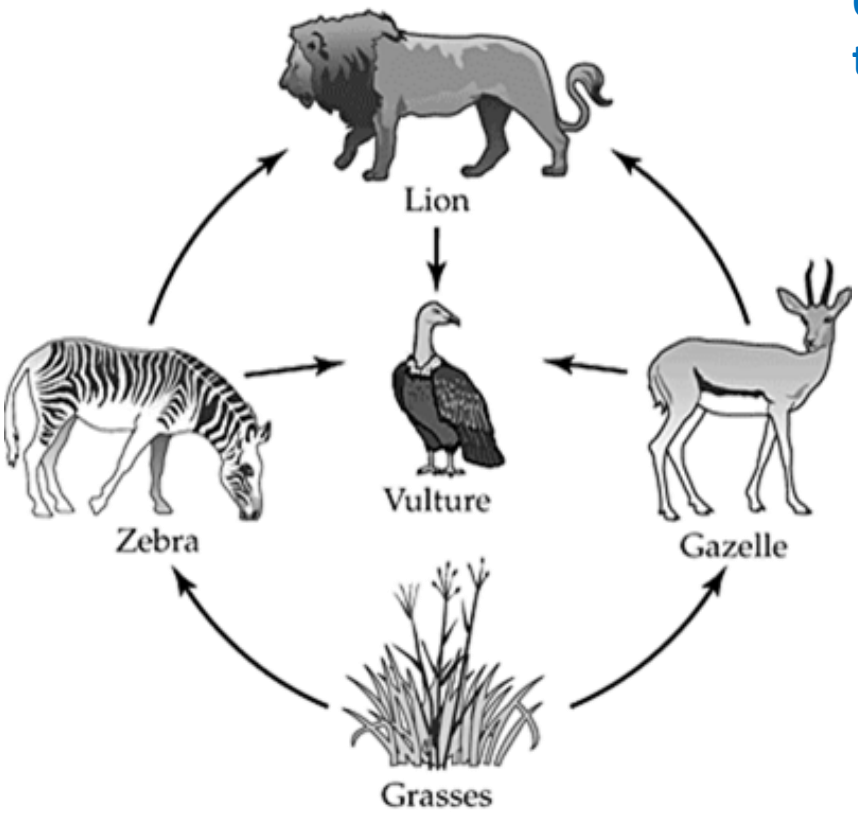
Ecosystems

Food chains combine to form food webs, and sit within an ecosystem.

Q9. What is an ecosystem?

Ecosystems are made up of both **biotic** (living) and **abiotic** (non living) factors



Q10. What abiotic factors can you think of in this image?

Gir Forest - India

One of the ecosystems ZSL works in is in the Gir Forest in west India.

This is a very special ecosystem, home to the last population of Asiatic lions in the wild and a place where wildlife is respected and protected by local people.

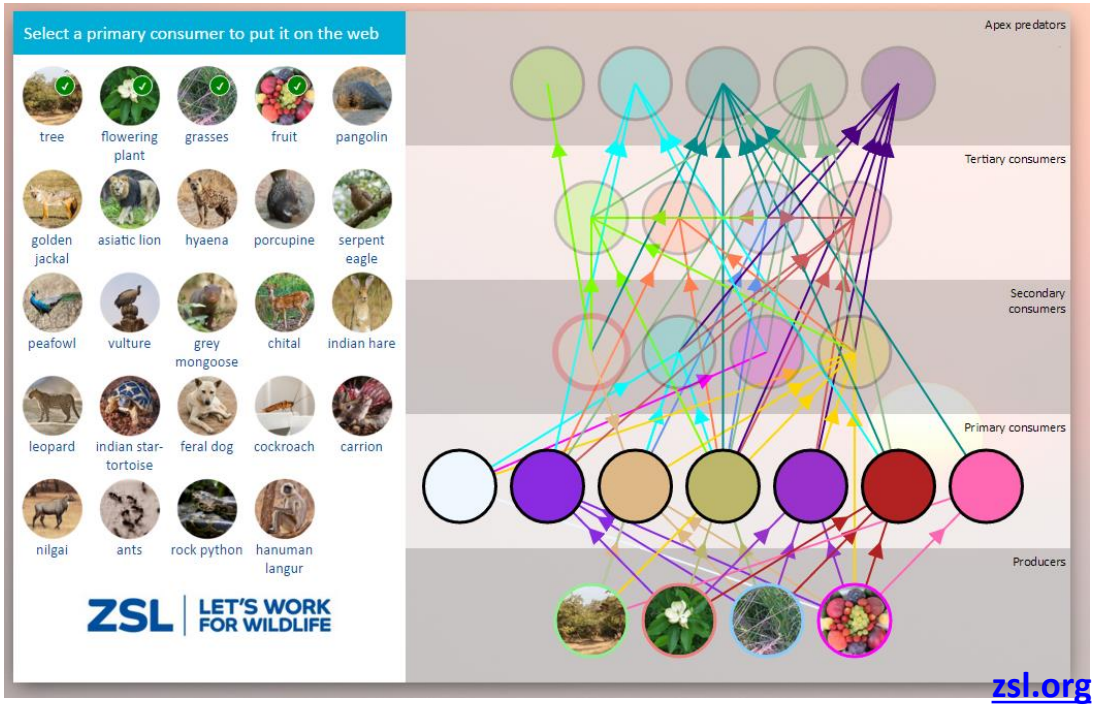
Learn more about this ecosystem and the work that ZSL does there by watching THIS VIDEO

Build a ‘Gir Forest Food Web’

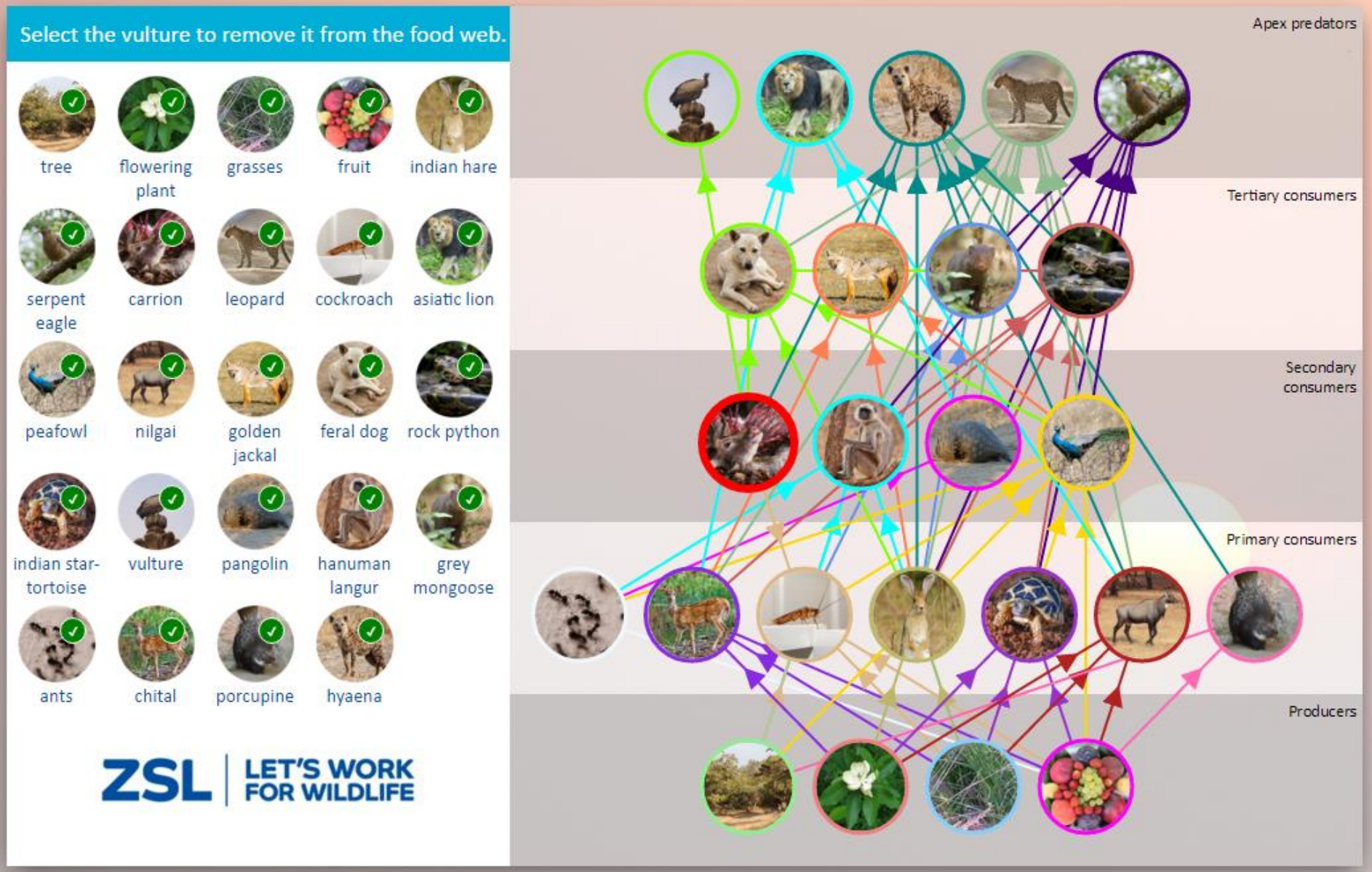
Q11. Follow the link below to our online ecosystem builder and have a go at building the food web for the Gir Forest ecosystem

CLICK HERE

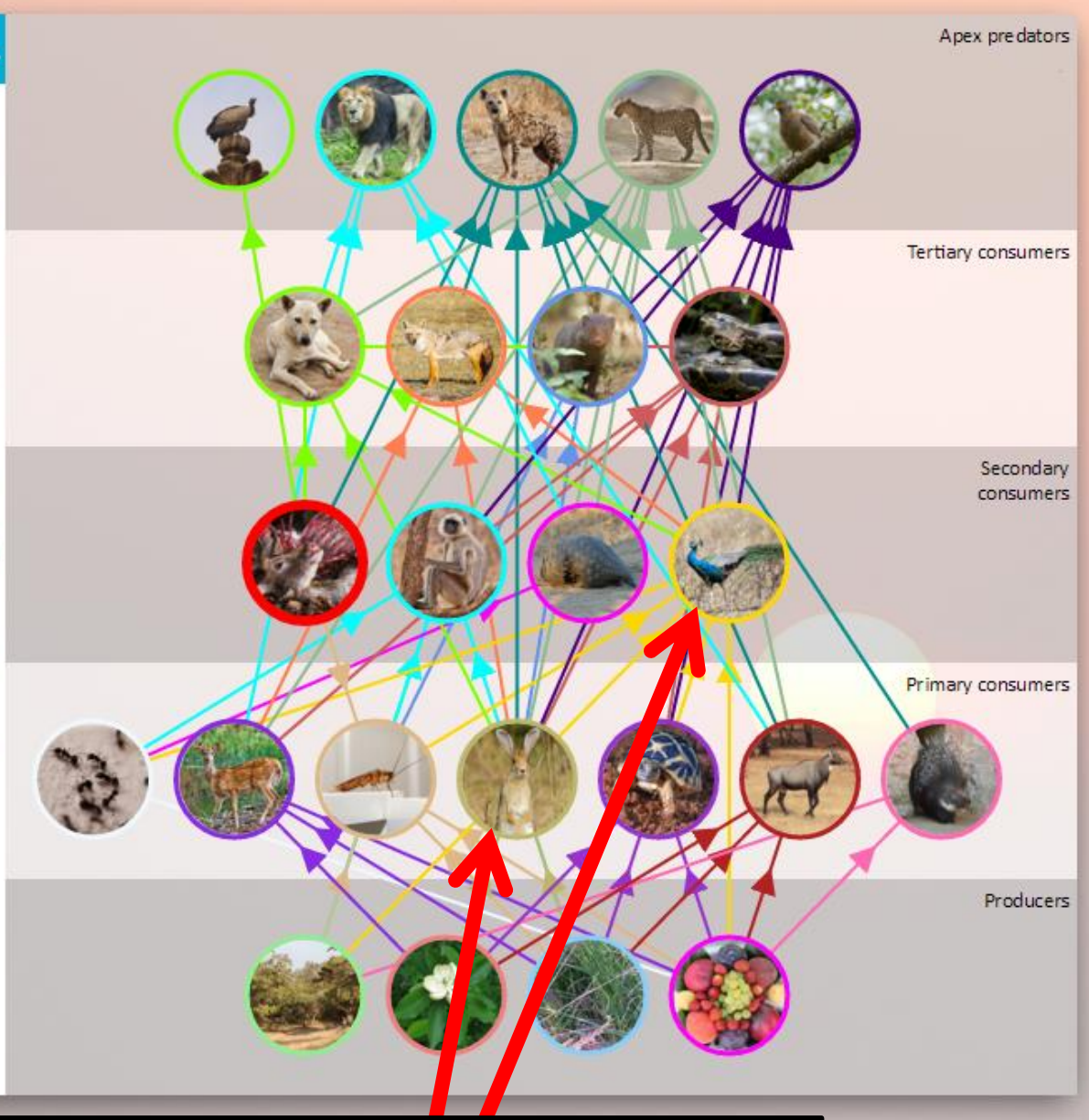
- Click the animal to find out more about it
- Use the information to work out where it fits
- Drag it to it’s place on the web
- Work up level by level



Then come back here and see if you can answer the following questions…



Q12. Are there any species that are not dependent on another? Or less dependent?



Lots of predators

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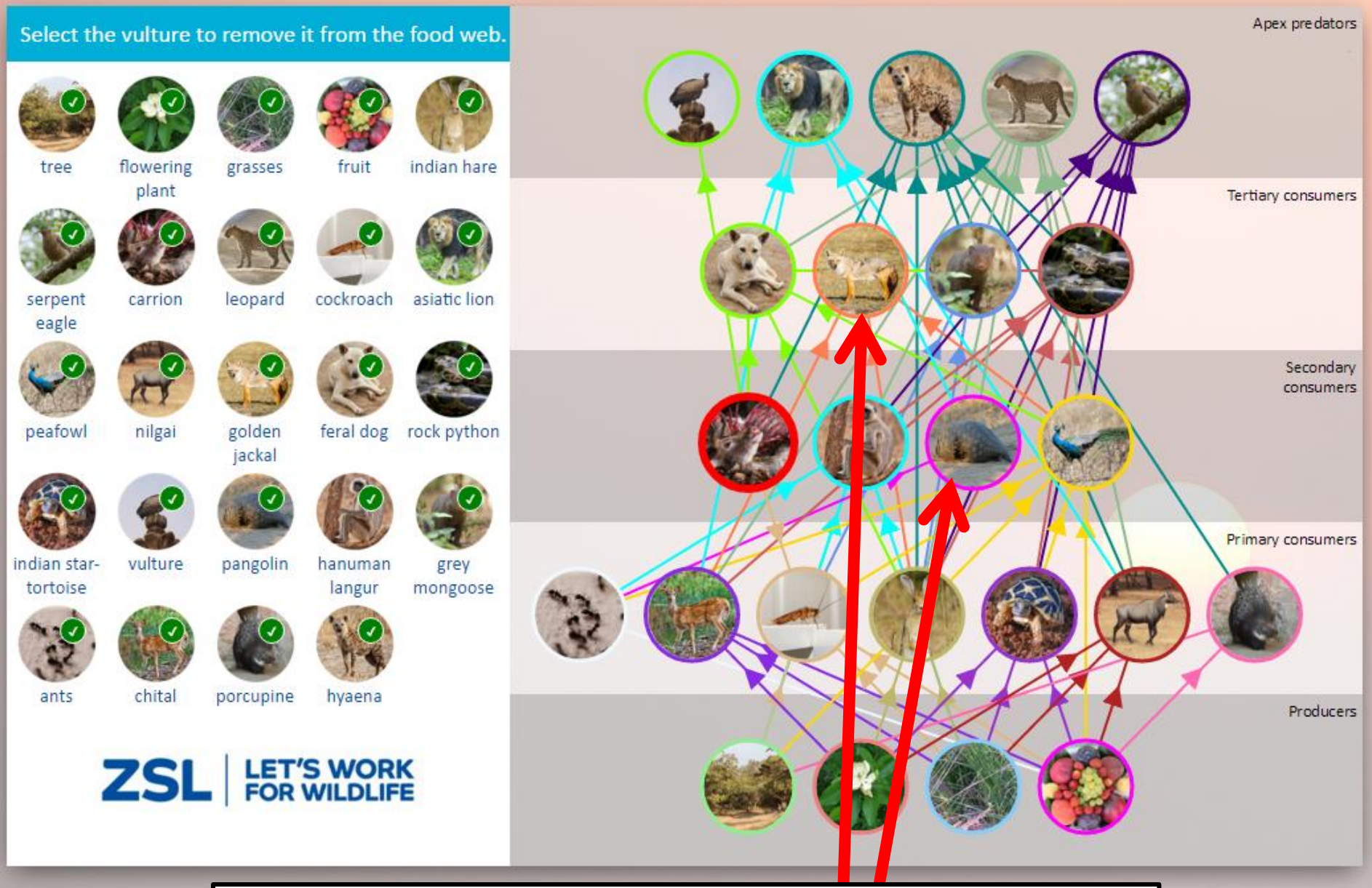

Not many predators

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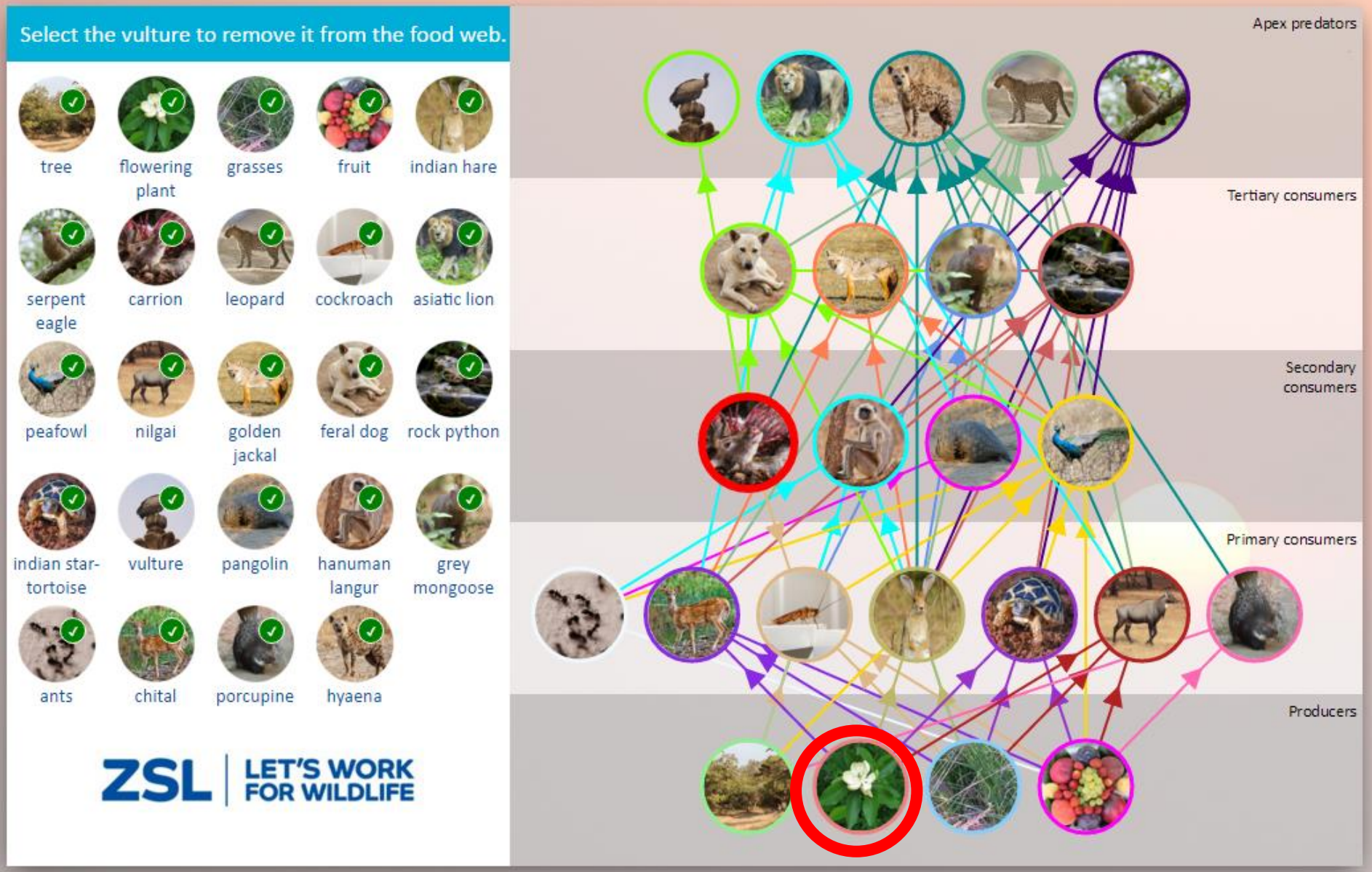
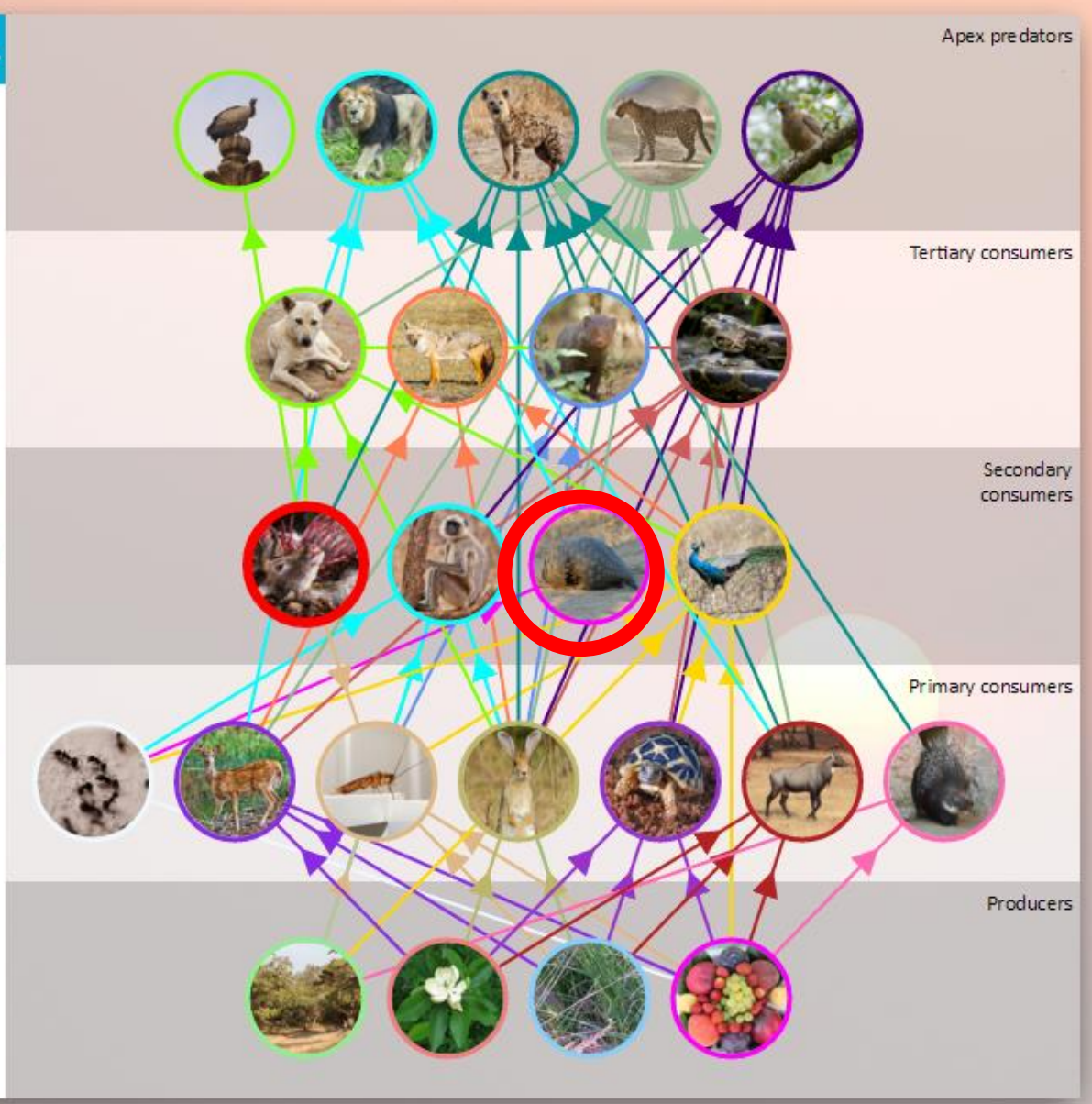
Interdependence

- Every animal in a food web is *dependent* on at least one other
- If animals or numbers change, the web is no longer stable
- This would have a big effect on the whole ecosystem



Q13. What might happen if there were no flowering plants?



Q14. ZSL is involved in conservation projects to protect pangolins. What might the impact be if their numbers increased?

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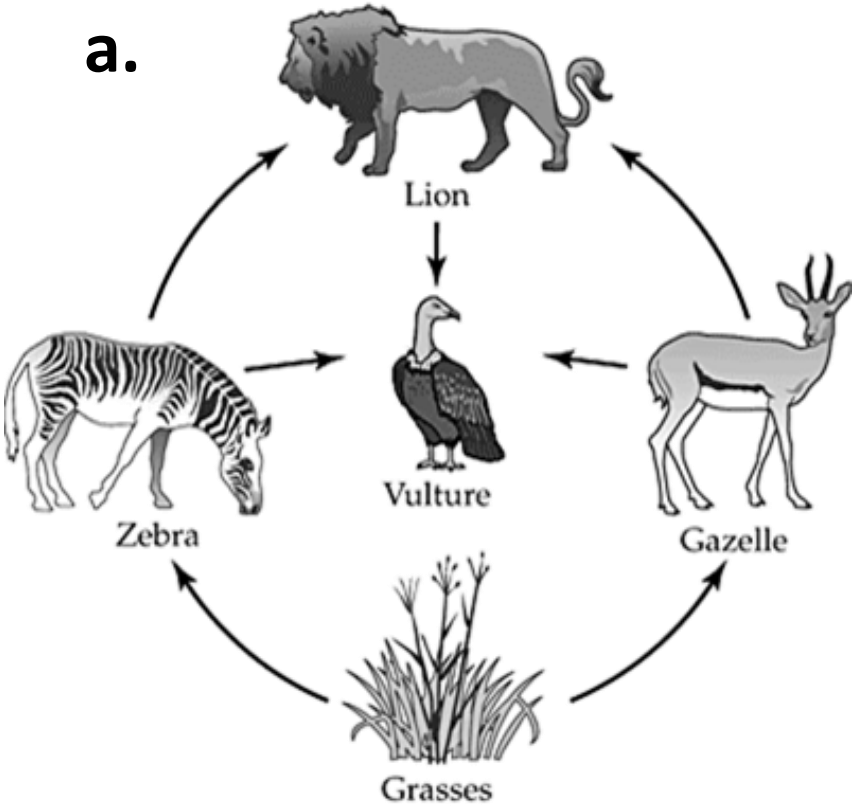
Biodiversity?

ZSL works to protect and increase biodiversity in ecosystems around the world, such as in the Gir Forest.

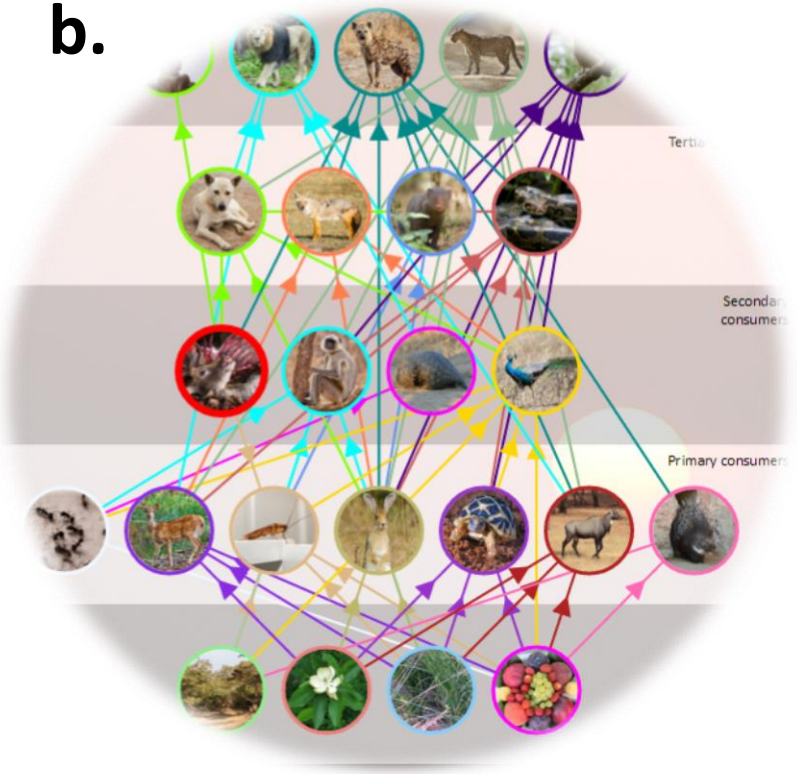
Q15. What is meant by biodiversity?

Q16. Which of the following ecosystems is more biodiverse?

a.



b.



Q17. Which of the above ecosystems is more stable to changes? Explain why.

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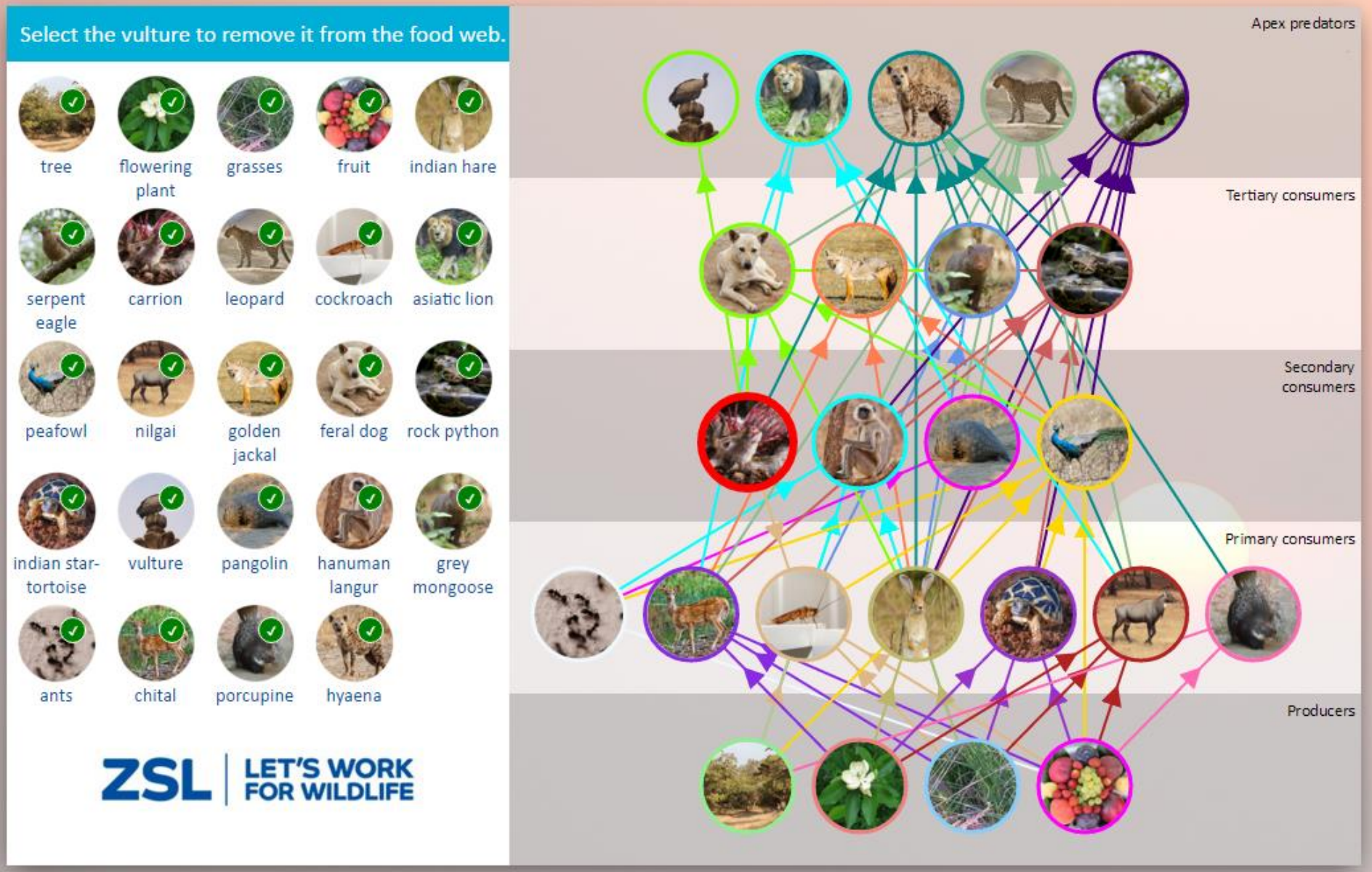
What if vultures suddenly declined?



Q18. What would happen if vultures suddenly disappeared from this ecosystem?

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This is exactly what happened in India and Nepal in the 80s and 90s.

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“Extremely effective scavengers”

Vultures have always been extremely effective scavengers. In the 1980’s, there were millions of vultures in India who could consume most of the carrion.

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“Vultures can destroy diseases in their digestive system”

People in India made use of this by placing animal carcasses on the outskirts of villages for the vultures to eat. This also removed diseases from the environment as vultures can destroy them in their digestive system.

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"Diclofenac started to be used"

In the 1990s, a drug called Diclofenac was introduced to treat inflammation and fever in cattle. In 1998, people started to notice that vultures were declining in India, Nepal and Pakistan.

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"ZSL scientists started to investigate"

ZSL scientists started to investigate what could be causing the vultures to decline.

In 2003, it was found that diclofenac causes kidney failure in vultures and is fatal. The three most affected species of vulture had already declined by more than 92% in India.

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“Feral dogs were increasing”

Because the vultures were no longer there to eat the carrion, there was a lot more food for feral dogs and their numbers were increasing.

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“Huge, aggressive packs”

Feral dogs began living in huge, aggressive packs. There were reports of feral dogs killing children and adults.

The large number of dogs also meant that diseases like anthrax, TB and rabies were more common and being spread more widely by the dogs.

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"Safe alternative drug introduced"

To help with the problem, ZSL, the National government and other conservation organisations were involved in getting diclofenac banned. This happened in 2006 and a safe alternative was introduced.

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"Tracking and breeding vultures"

ZSL vets have since been involved in catching, tagging, tracking and breeding vultures to monitor how they are doing.

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“Vulture restaurants”

‘Vulture restaurants’ were also set up to allow vultures to feed on safe carrion, whilst the last of the diclofenac left the ecosystem.

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"Numbers are improving"

The three most affected species are still '*Critically Endangered*' but numbers are improving because of this important conservation work. This work was only possible due to an understanding of the relationships within this ecosystem and its food webs.

Thanks for joining!
If you want to find out more, check out the following :

ZSL Vulture Conservation

Protecting the last of the Asiatic lions

ZSL's work on ecosystems around the world

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Answers

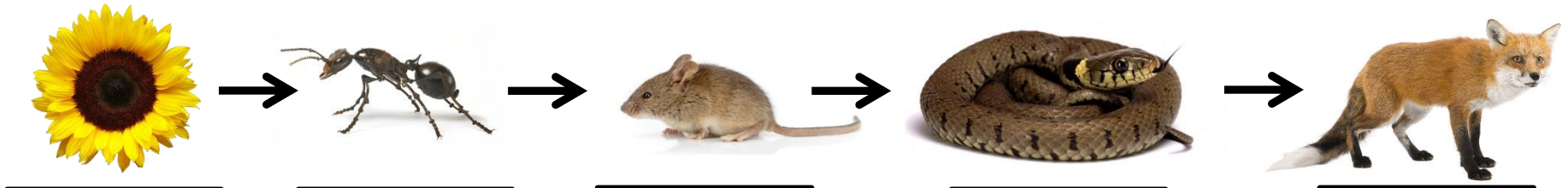
Q1. What does ZSL stand for and what do they do?

ZSL, the Zoological Society of London, is an international conservation charity working to create a world where wildlife thrives. We're working every day to achieve this, through our science, our field conservation around the world and engaging millions of people through our two Zoos, ZSL London and ZSL Whipsnade Zoos.

Q2. What is a food chain?

A food chain shows the different organisms that live in a habitat, and what eats what

Q3. Put the following native species into a food chain, labelling each level. (Make sure you put the arrows in the right direction!)



Q4. What do the arrows show?

The arrows show the passage of energy up the food chain, from the producer to apex predator

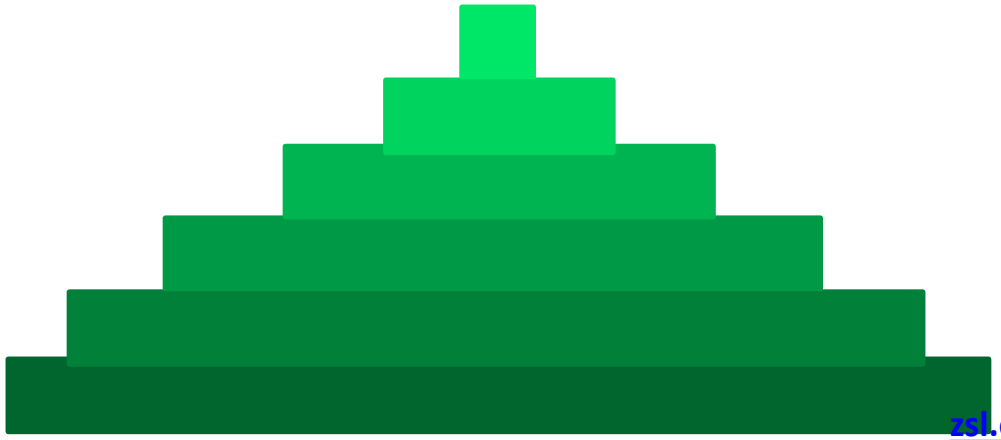
Q5. Can you think of anything that might eat the fox even though it is the apex predator?

Scavengers (like a crow or raven) or decomposers (which feed on dead and decaying organisms – commonly fungi or bacteria)

Q6. What is biomass?

Biomass is biological mass, the plant or animal matter that is used for generating energy by the next level up the food chain.

Q7. Draw a pyramid of biomass for this ecosystem, where the width of each bar represents the amount of biomass present at each level.



Q8. Only 10% of the biomass from each level is transferred up to the next – why?

Some is lost during the animal's lifetime as heat or waste during life processes, and not all the biomass eaten is able to be digested and is therefore lost in urine or faeces.

Q9. What is an ecosystem?

A biological community of interacting organisms and their physical environment

Q10. What abiotic factors can you think of in this image?

Rain, sunshine, water availability, soil pH, soil type, light intensity, wind, shade etc.

Q12. Are there any species that are not dependent on another? Or less dependent?

The peacock and the hare are very important as they have lots of predators who are dependent upon them. The pangolin and the golden jackal have very few predators dependent upon them.

Q13. What might happen if there were no flowering plants?

Nearly every other animal in the higher levels might be effected and decrease due to lack of food.

Q14. ZSL is involved in conservation projects to protect pangolins. What might the impact be if their numbers increased?

Pangolins have few predators, and only feed on ants and termites, so increasing the number of pangolins might not have too large an impact on the ecosystem. It's important to understand this before you work to increase a species' numbers.

Q15. What is meant by biodiversity?

The variety of different species of organisms present in the world or in a specific ecosystem

Q16. Which of the following ecosystems is more biodiverse? b.

Q17. Which of the above ecosystems is more stable to changes? Explain why.

b. The more biodiverse the ecosystem, the more stable it is as there is more interdependence, thus reducing the dependence of one species on any one other. For example, is one prey species is lost, it has others it can rely on.

Q18. What would happen if vultures suddenly disappeared from this ecosystem?

The amount of carrion (dead animals) left around would increase with no vultures to eat it, and there would therefore be a rise in feral dog numbers as they have more food.