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Introducing Ecosystems

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Objectives

To understand the mechanics that control food webs and ecosystems

To appreciate the interdependency that exists between the different parts of any ecosystem

To be able to quantify elements of Gersmehl's model and interpret the relative sizes of nutrient flows and stores

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Food webs are an important part of ecosystems.

What is a food web?

What might it tell us about the relationships between plants and animals?

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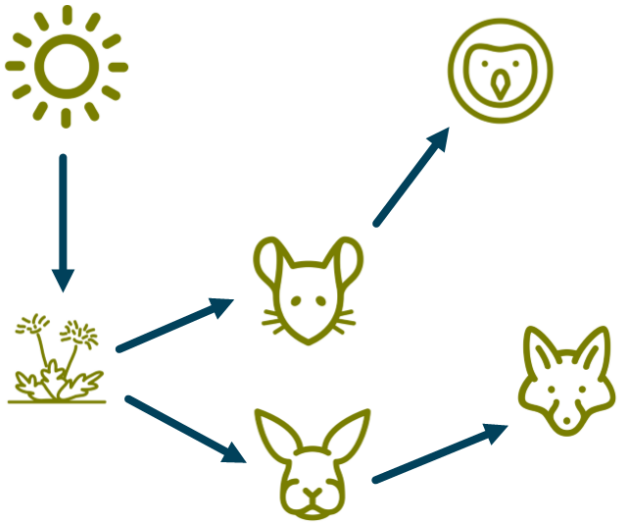
Food Web: A system of linked organisms that depend on each other for sources of energy.



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Ecosystem

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Ecosystem

A network of biotic and abiotic elements interacting with each other and their physical environment

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Ecosystem

A network of biotic and abiotic elements interacting with each other and their physical environment

Biome

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Ecosystem

A network of biotic and abiotic elements interacting with each other and their physical environment

Biome

A large geographical area of distinctive vegetation and animal groups

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Food Web

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Food Web

A system of interconnected food chains

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Food Web

A system of interconnected food chains

Food Chain

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Food Web

A system of interconnected food chains

Food Chain

A series of organisms that depend on each other for a source of food

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Primary Producer

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Primary Producer

An organism that converts solar energy into mass

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Primary Producer

An organism that converts solar energy into mass

Primary Consumer

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Primary Producer

An organism that converts solar energy into mass

Primary Consumer

An organism that gains energy by eating a primary producer

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Secondary Consumer

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Secondary Consumer

An organism that gains energy by eating a primary consumer

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Secondary Consumer

An organism that gains energy by eating a primary consumer

Decomposer

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Secondary Consumer

An organism that gains energy by eating a primary consumer

Decomposer

An organism that breaks down other organisms into nutrient matter

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Herbivore

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Herbivore

An organism that only feeds on vegetation

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Herbivore

An organism that only feeds on vegetation

Carnivore

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Herbivore

An organism that only feeds on vegetation

Carnivore

An organism that only feeds on animals

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Omnivore

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Omnivore

An organism that eats both vegetation and animals

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Omnivore

An organism that eats both vegetation and animals

Tropic Level

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Omnivore

An organism that eats both vegetation and animals

Tropic Level

The position an organism occupies in a food chain

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Biotic

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Biotic

Living organisms within an ecosystem

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Biotic

Living organisms within an ecosystem

Abiotic

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Biotic

Living organisms within an ecosystem

Abiotic

Non-living components in an ecosystem

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On your sheet, draw arrows that show the different of energy flow from one organism to another.

HINT: The arrow always starts at the organism that is providing the energy

Sun

Peregrine Falcon

Sparrow

Fox

Dandelion

Snail

Hedgehog

Rabbit

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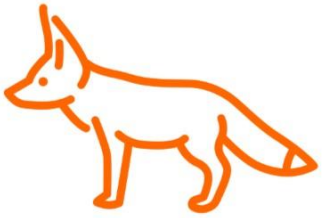
Sun

Peregrine Falcon

Sparrow



Fox

Dandelion

Snail

Hedgehog

Rabbit

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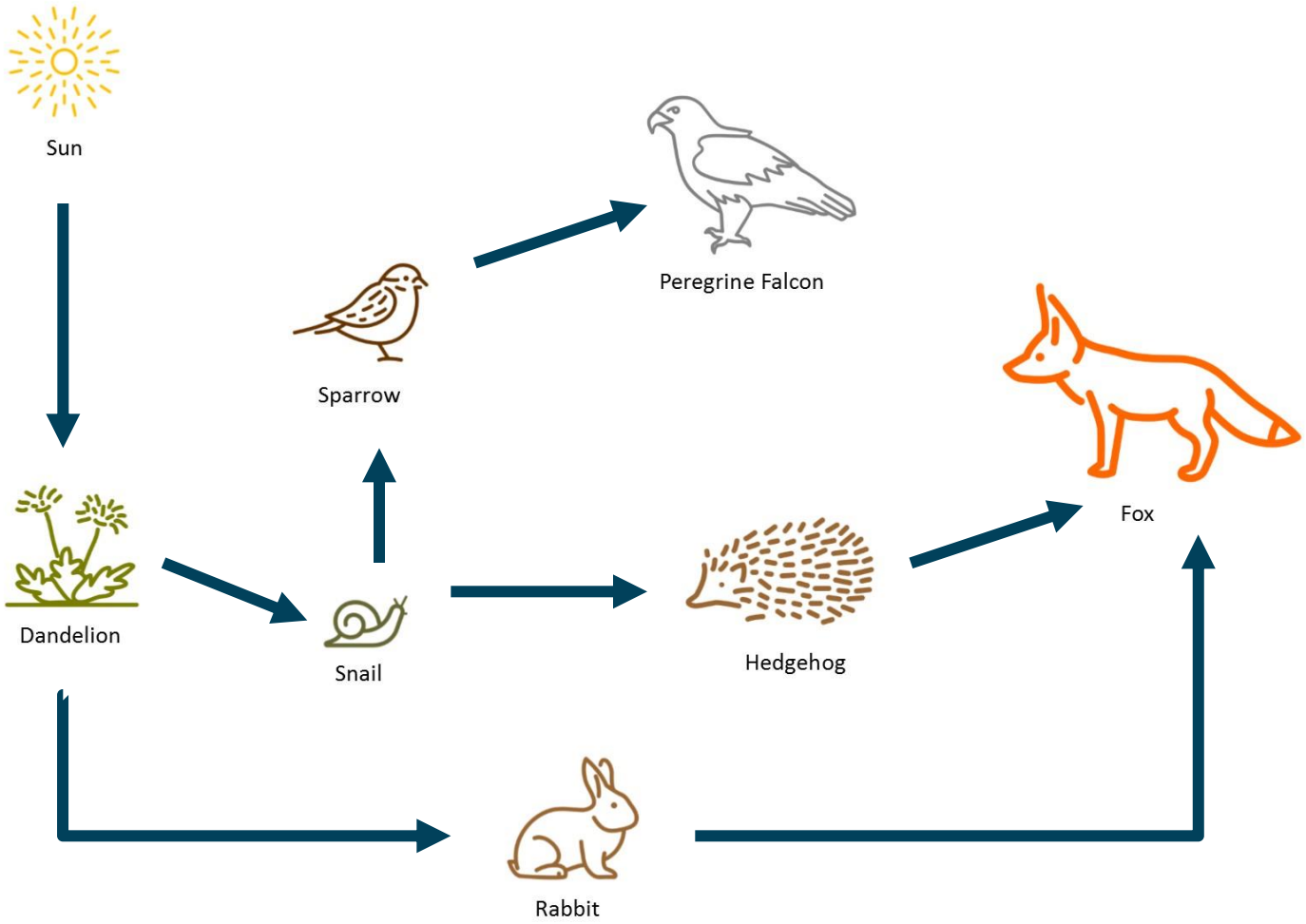

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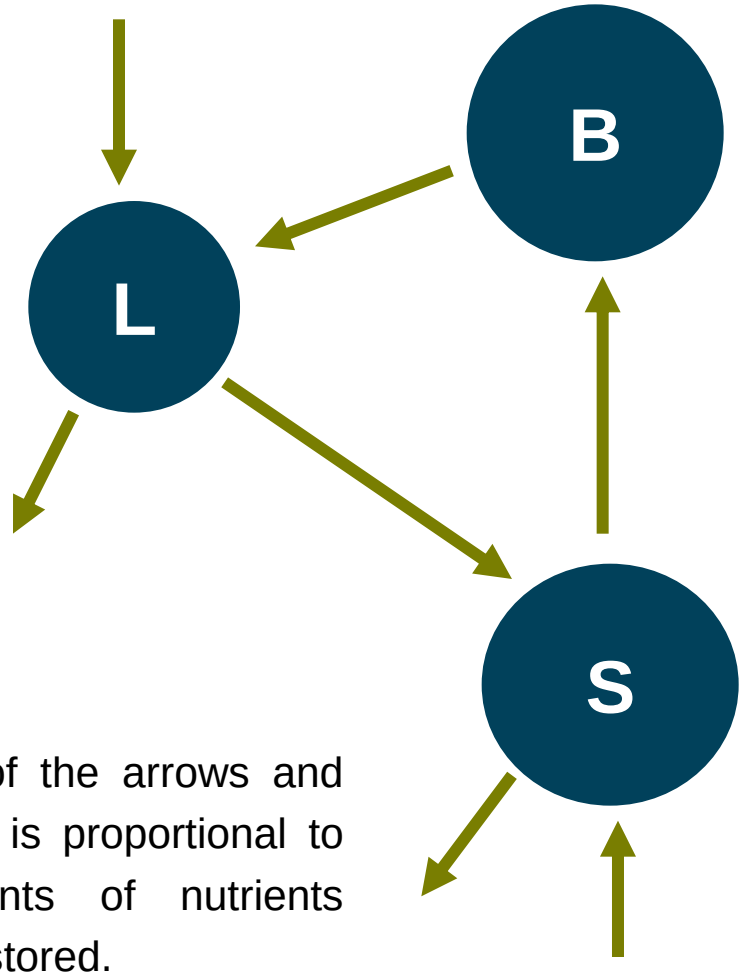
Another way of representing food webs on paper is through **Gersmehl's Model**. This model looks at the relative value of nutrients that are flowing around a food web (the arrows) as well as the places in which they are stored (the circles).

Rather than name particular species, Gersmehl referred to the three main stores of nutrients found in any ecosystem:

- the living **biomass** (B)
- organic matter in leaf **litter** (L)
- and the **soil** (S)



The size of the arrows and the circles is proportional to the amounts of nutrients flowing or stored.

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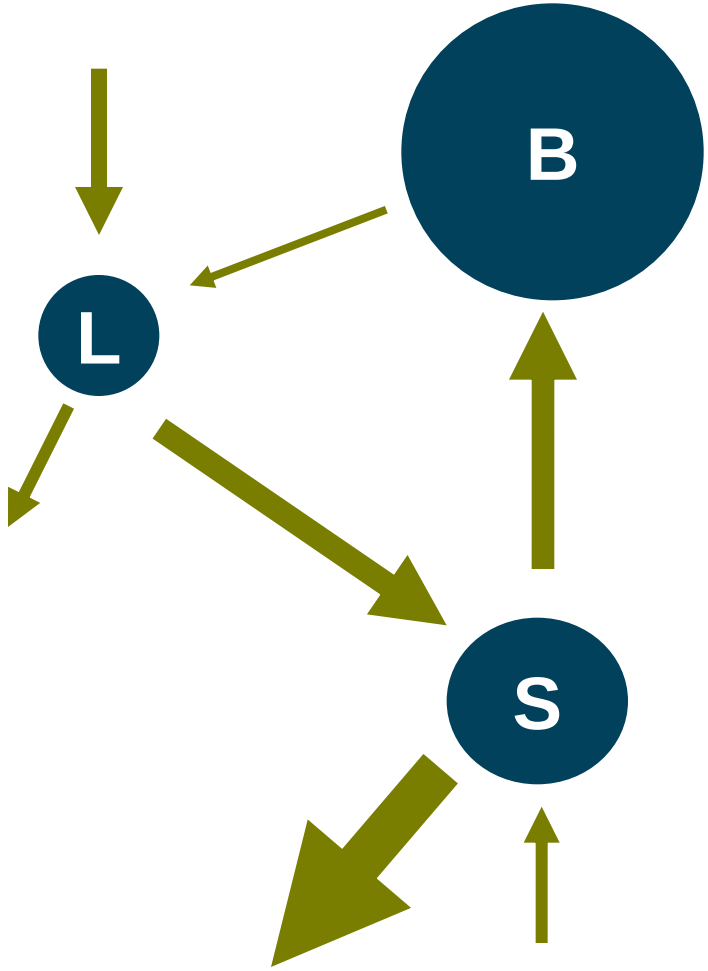

In this example, which is greater:

- Nutrients gained by the soil through weathering or by decomposition?

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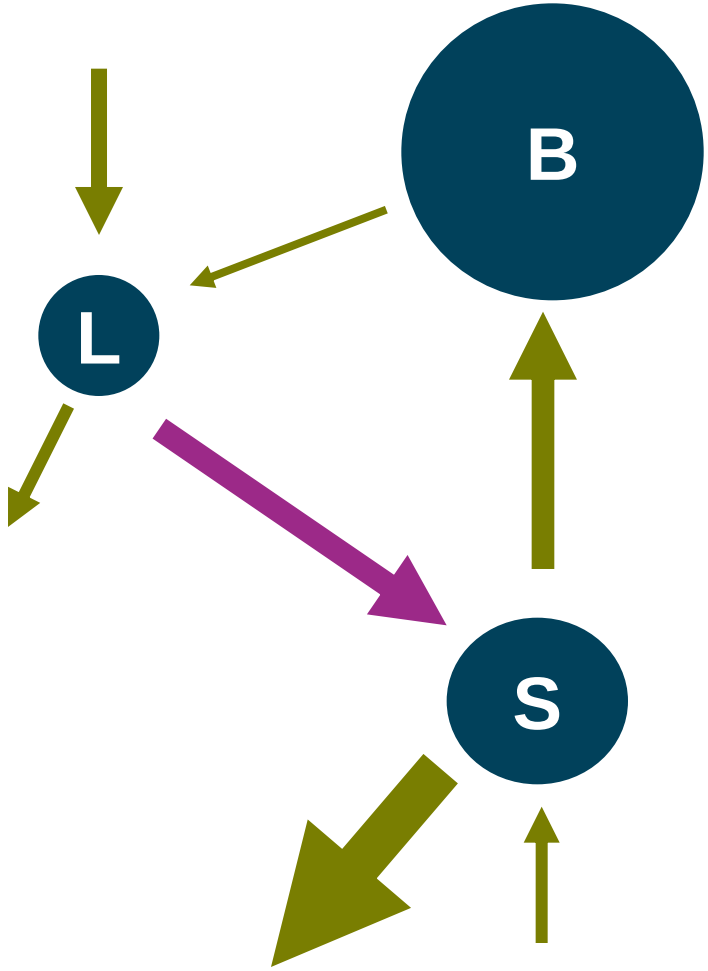

In this example, which is greater:

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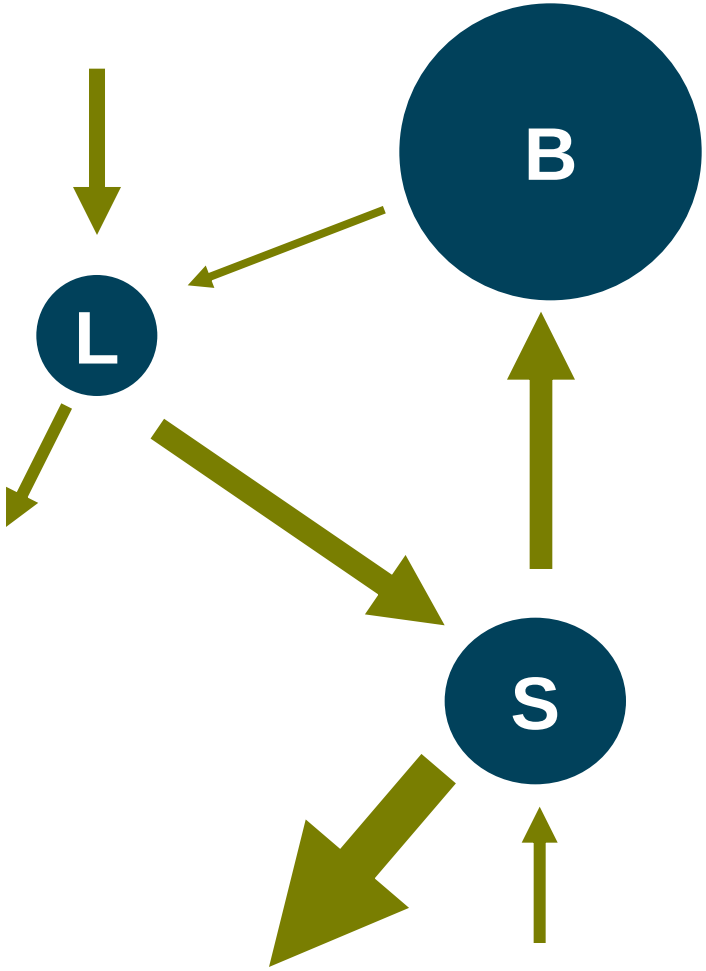

In this example, which is greater:

- Nutrients lost from the biomass through leaf loss or gained through take up from the soil?

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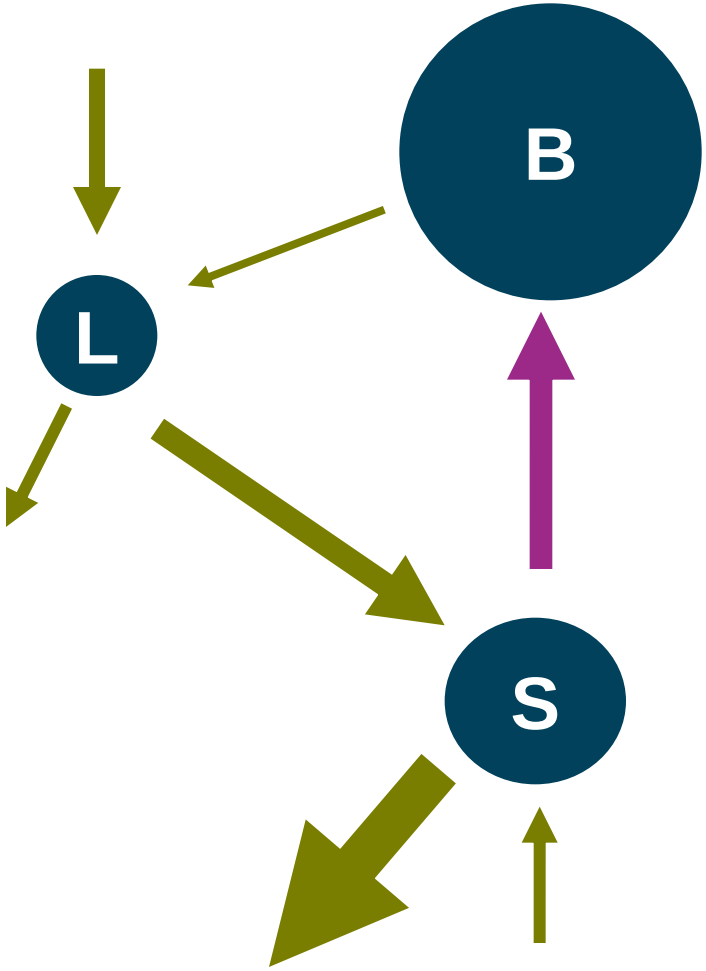

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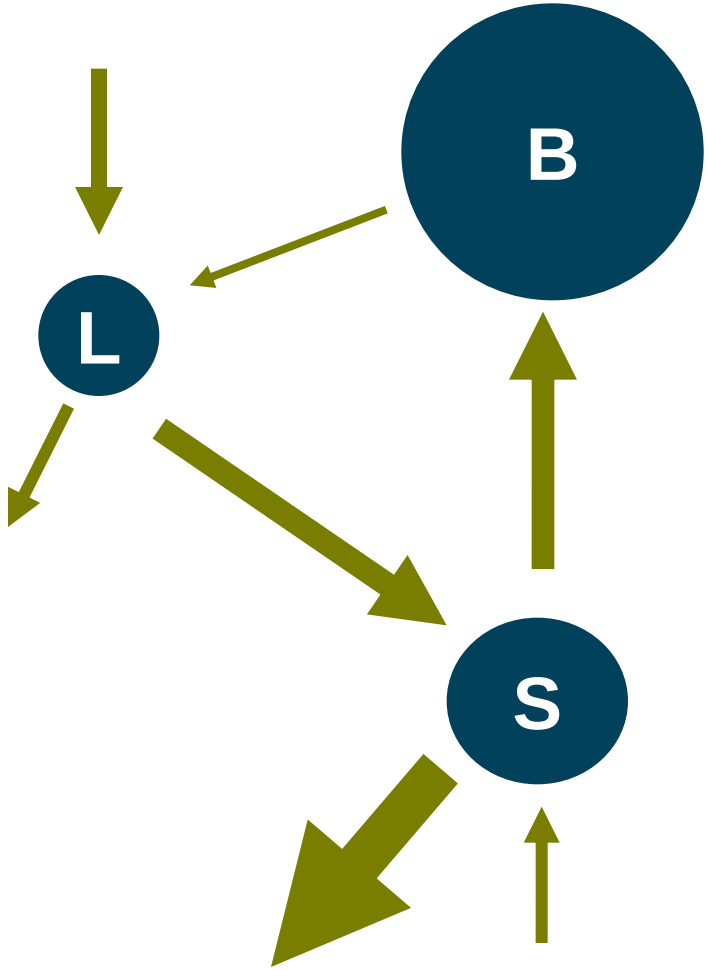

In this example, which is greater:

- Nutrients stored in the trees or in the soil?

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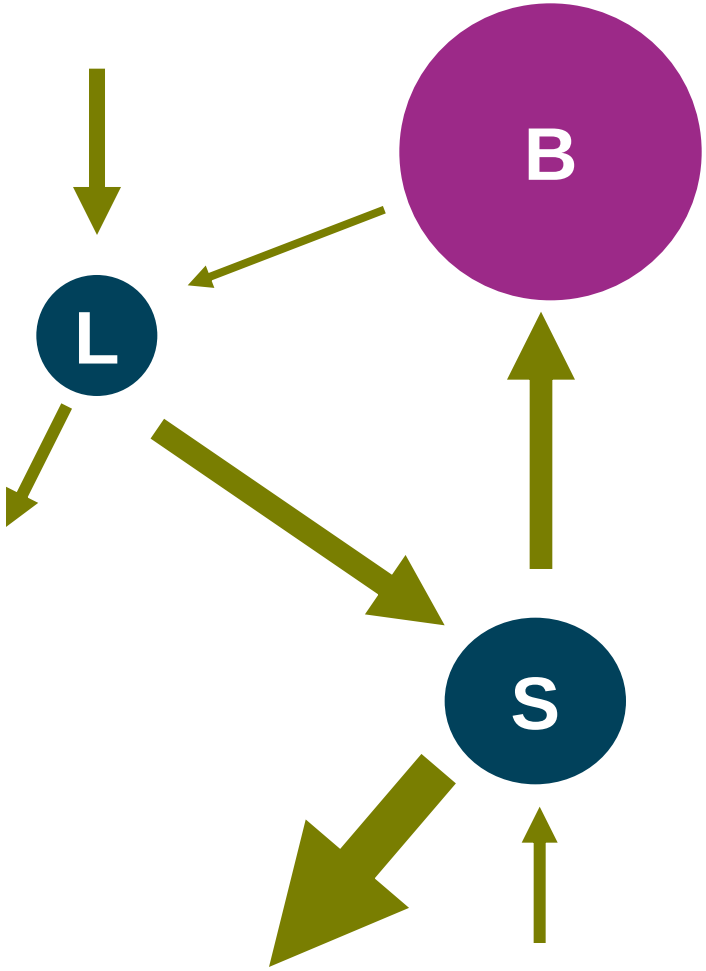

In this example, which is greater:

- **Nutrients stored in the trees** or in the soil?

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Which description matches the model shown?

a) Coniferous forest in Scandinavia

b) Tropical rainforest in Brazil

c) Grasslands of Central USA

d) None of the above

Ready…?

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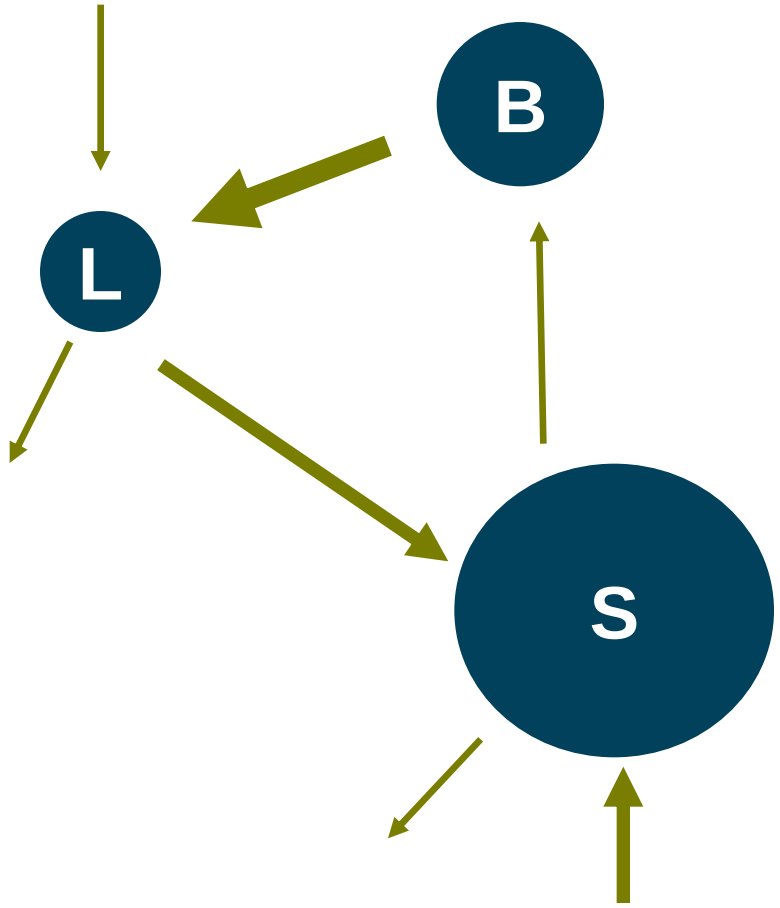

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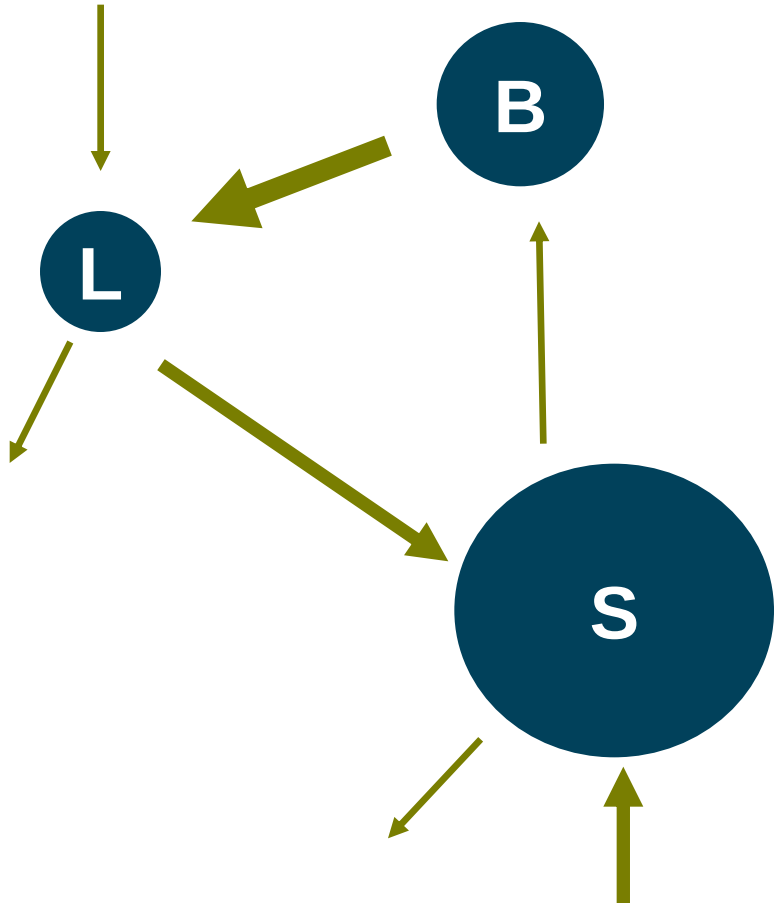
Which description matches the model shown?



c) Grasslands of Central USA

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a) Coniferous forest in Scandinavia

b) Tropical rainforest in Brazil

c) Grasslands of Central USA

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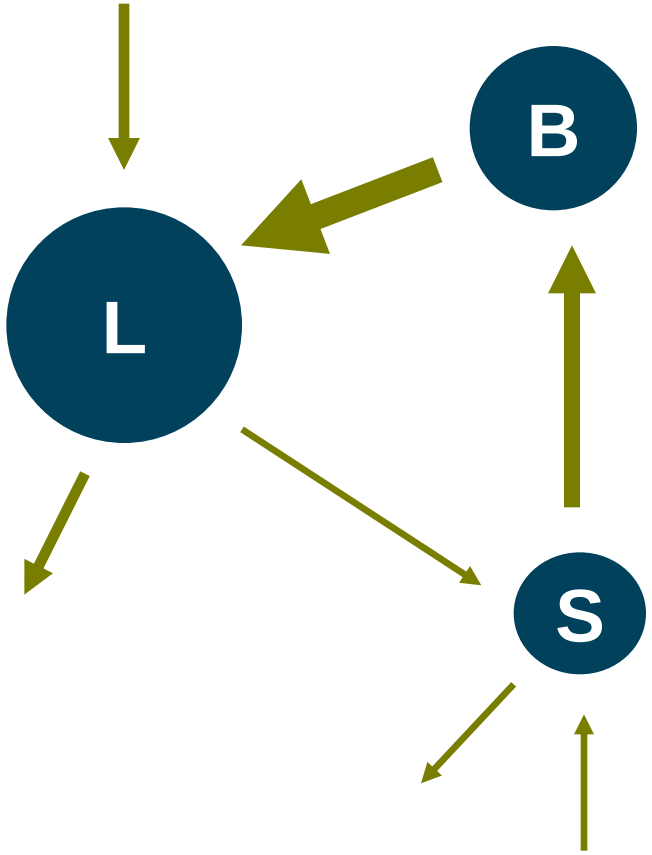

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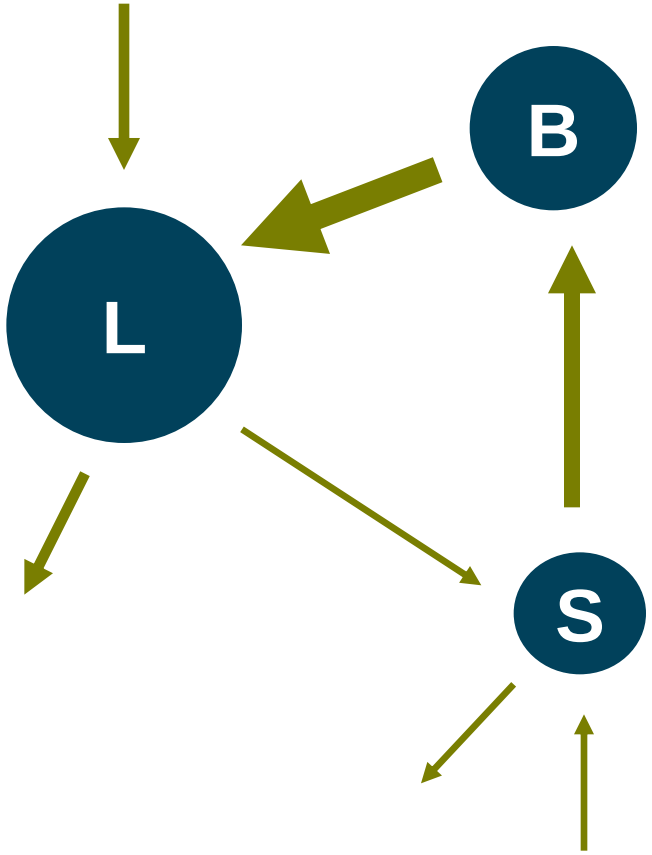
Which description matches the model shown?

a) Coniferous forest in Scandinavia



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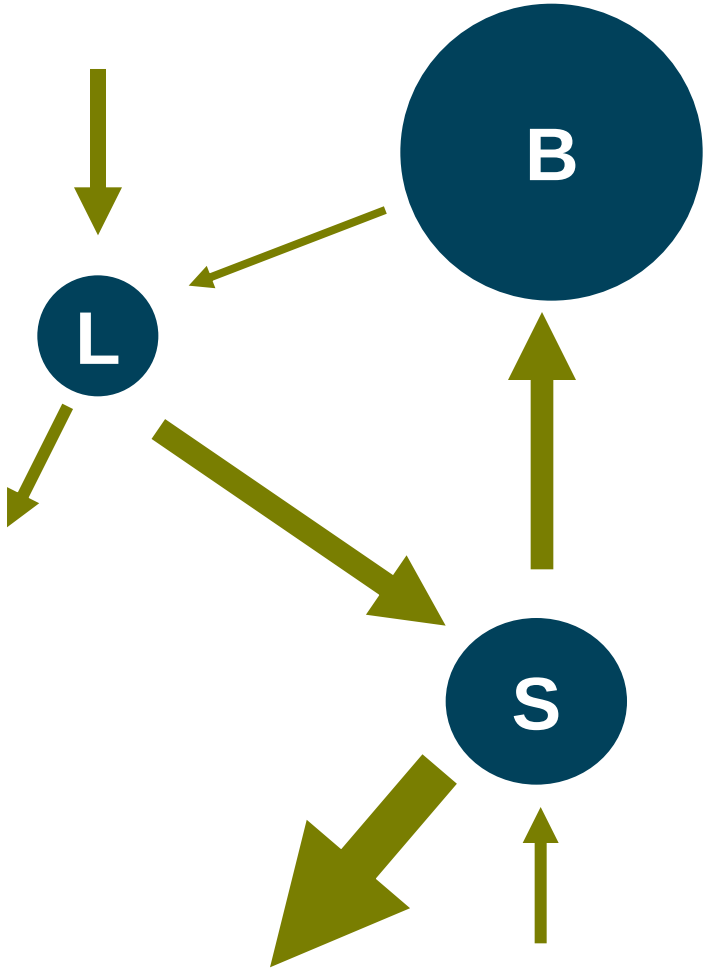

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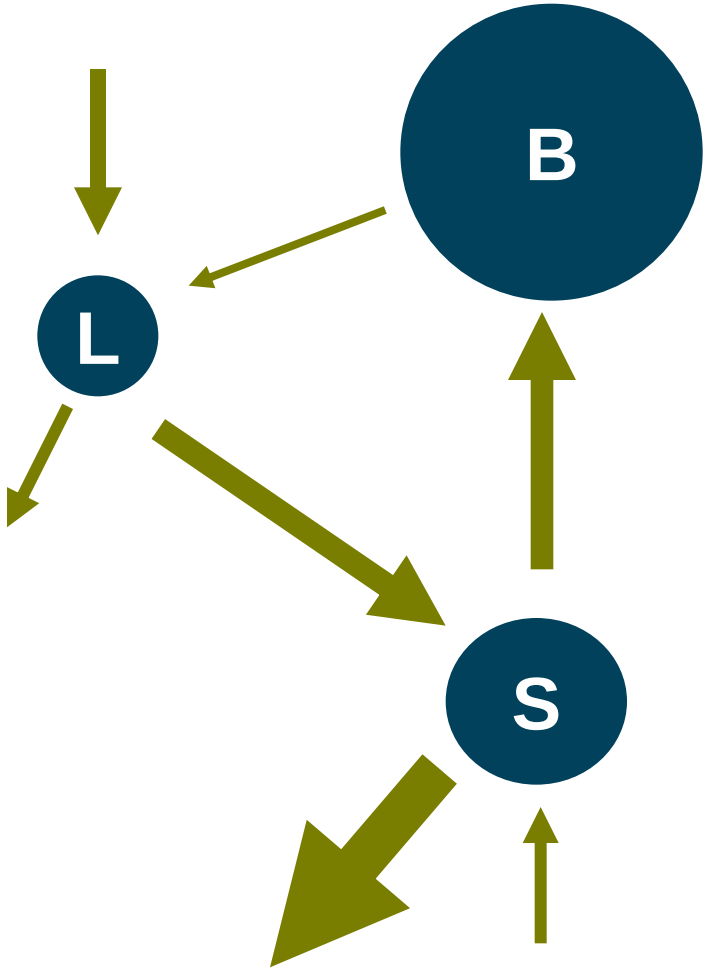
Which description matches the model shown?

b) Tropical rainforest in Brazil



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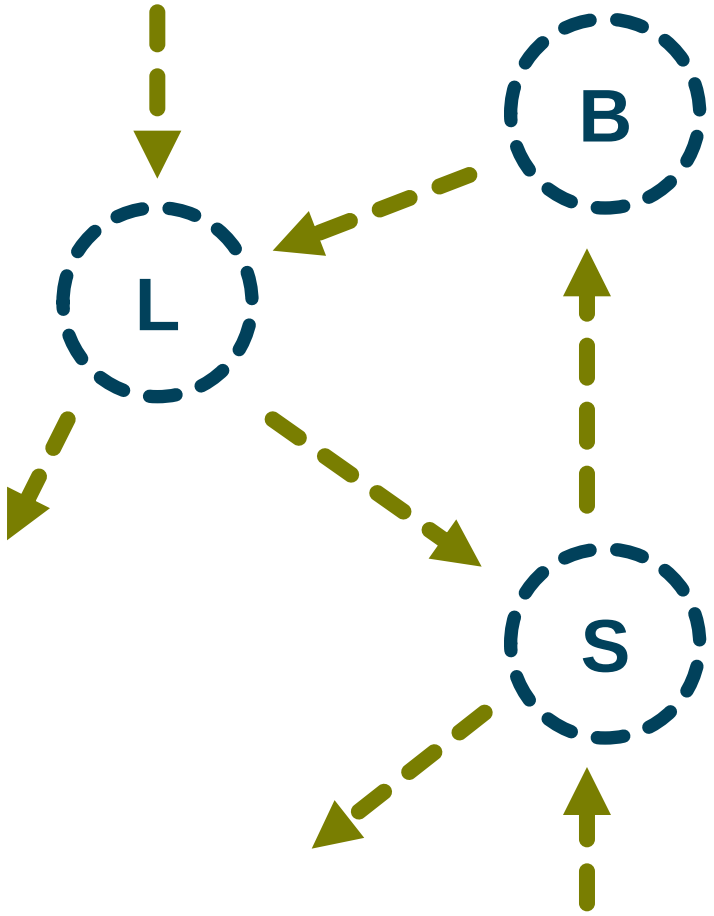
What would a Gersmehl Model look like for a temperate woodland in the UK?



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Ecosystems: Key Definitions

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Ecosystem

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Ecosystem

A network of biotic and abiotic elements interacting with each other and their physical environment

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Ecosystem

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Biome

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Ecosystem

A network of biotic and abiotic elements interacting with each other and their physical environment

Biome

A large geographical area of distinctive vegetation and animal groups

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Food Web

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Food Web

A system of interconnected food chains

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Food Web

A system of interconnected food chains

Food Chain

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Food Web

A system of interconnected food chains

Food Chain

A series of organisms that depend on each other for a source of food

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Primary Producer

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Primary Producer

An organism that converts solar energy into mass

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Primary Producer

An organism that converts solar energy into mass

Primary Consumer

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Primary Producer

An organism that converts solar energy into mass

Primary Consumer

An organism that gains energy by eating a primary producer

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Secondary Consumer

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Secondary Consumer

An organism that gains energy by eating a primary consumer

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Secondary Consumer

An organism that gains energy by eating a primary consumer

Decomposer

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Secondary Consumer

An organism that gains energy by eating a primary consumer

Decomposer

An organism that breaks down other organisms into nutrient matter

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Herbivore

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Herbivore

An organism that only feeds on vegetation

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Herbivore

An organism that only feeds on vegetation

Carnivore

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Herbivore

An organism that only feeds on vegetation

Carnivore

An organism that only feeds on animals

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Omnivore

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Omnivore

An organism that eats both vegetation and animals

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Omnivore

An organism that eats both vegetation and animals

Tropic Level

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Omnivore

An organism that eats both vegetation and animals

Tropic Level

The position an organism occupies in a food chain

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Biotic

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Biotic

Living organisms within an ecosystem

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Biotic

Living organisms within an ecosystem

Abiotic

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Biotic

Living organisms within an ecosystem

Abiotic

Non-living components in an ecosystem

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Food Webs and Energy Flows

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On your sheet, draw arrows that show the different of energy flow from one organism to another.

HINT: The arrow always starts at the organism that is providing the energy


Sun


Peregrine Falcon


Sparrow


Fox


Dandelion


Snail


Hedgehog


Rabbit

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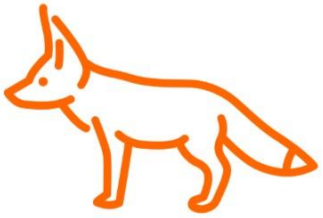
Sun

Peregrine Falcon

Sparrow



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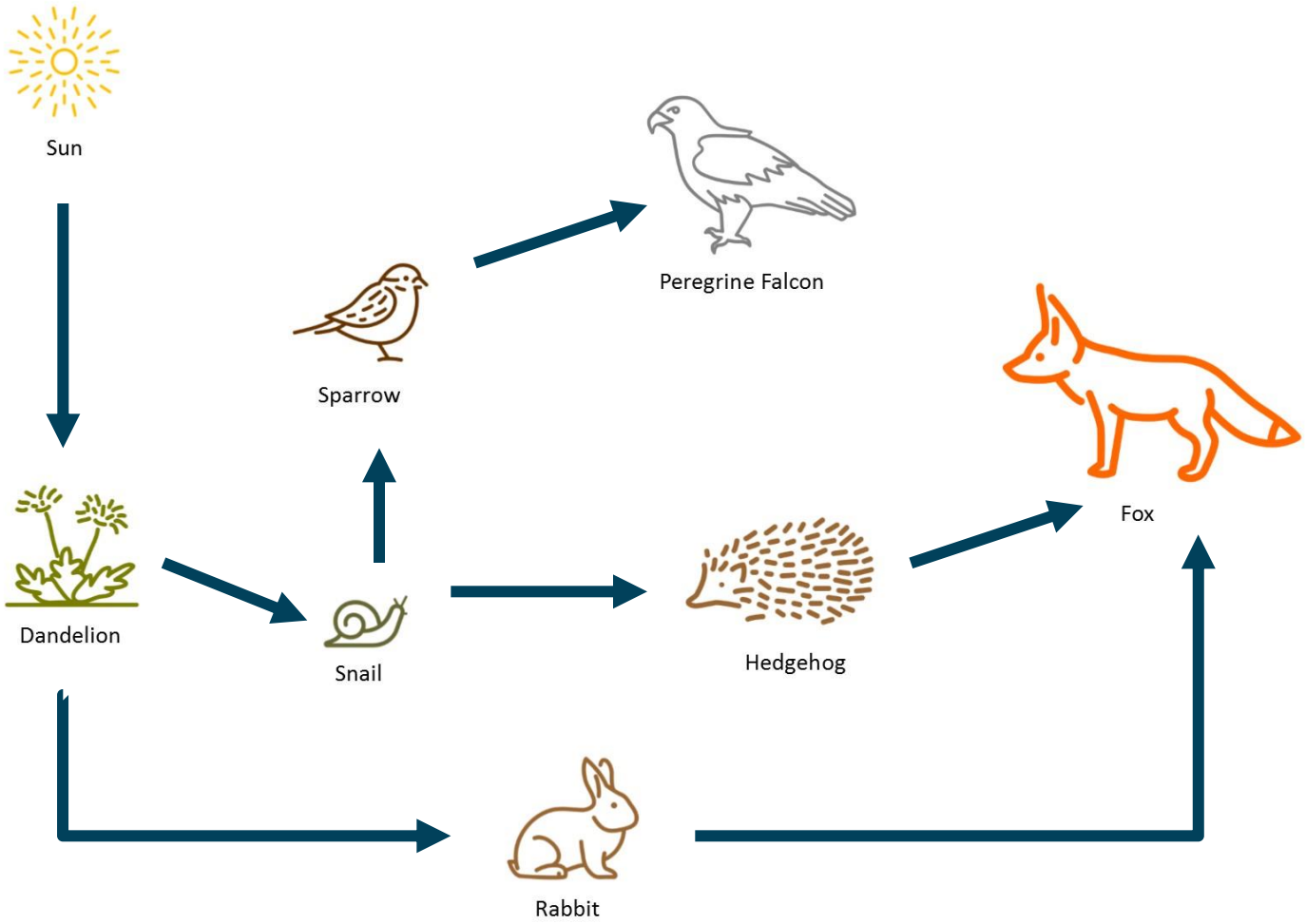

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Gersmehl's Model

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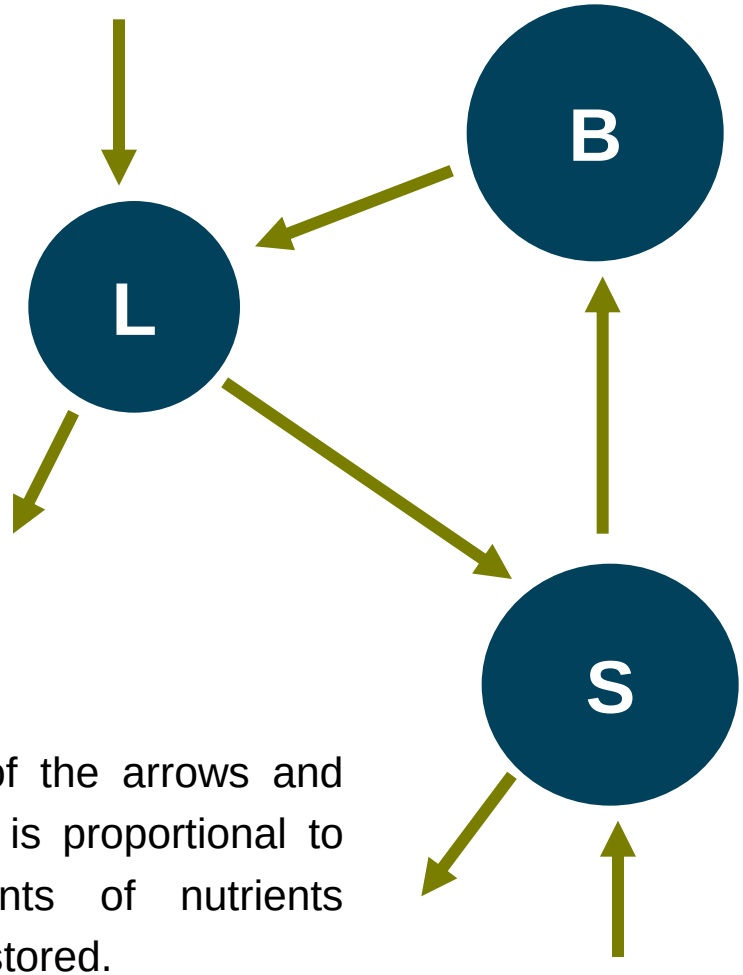
Another way of representing ecosystems on paper is through **Gersmehl's Model**. This model looks at the relative value of nutrients that are flowing around an ecosystem (the arrows) as well as the places in which they are stored (the circles).

Rather than name particular species, Gersmehl referred to the three main stores of nutrients found in any ecosystem:

- the living **biomass** (B)
- organic matter in leaf **litter** (L)
- and the **soil** (S)



The size of the arrows and the circles is proportional to the amounts of nutrients flowing or stored.

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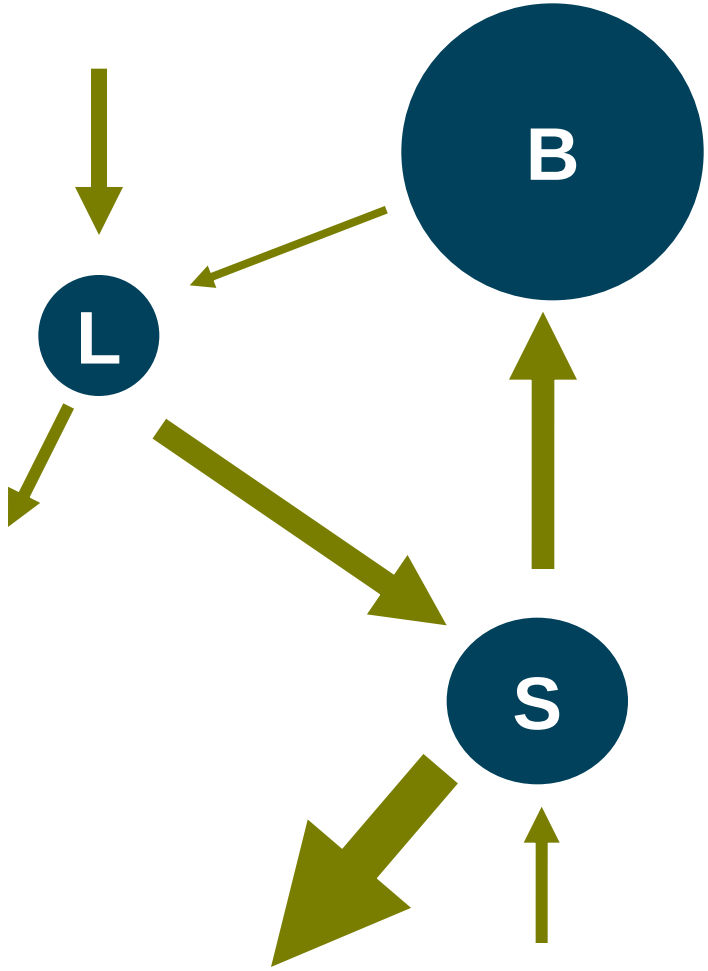

In this example, which is greater:

- Nutrients gained by the soil through weathering or by decomposition?

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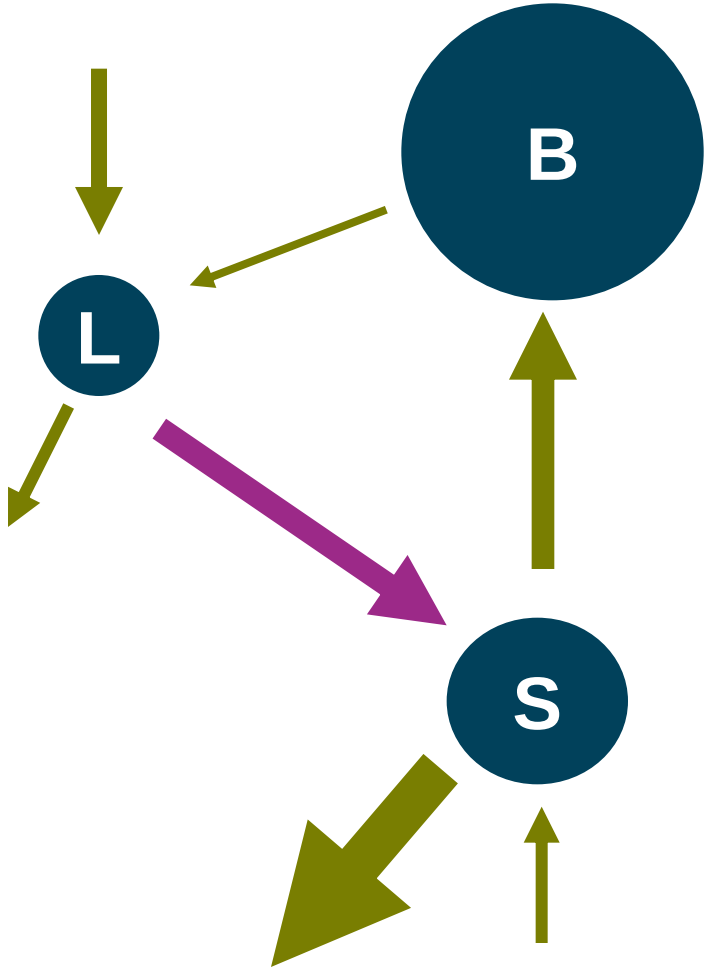

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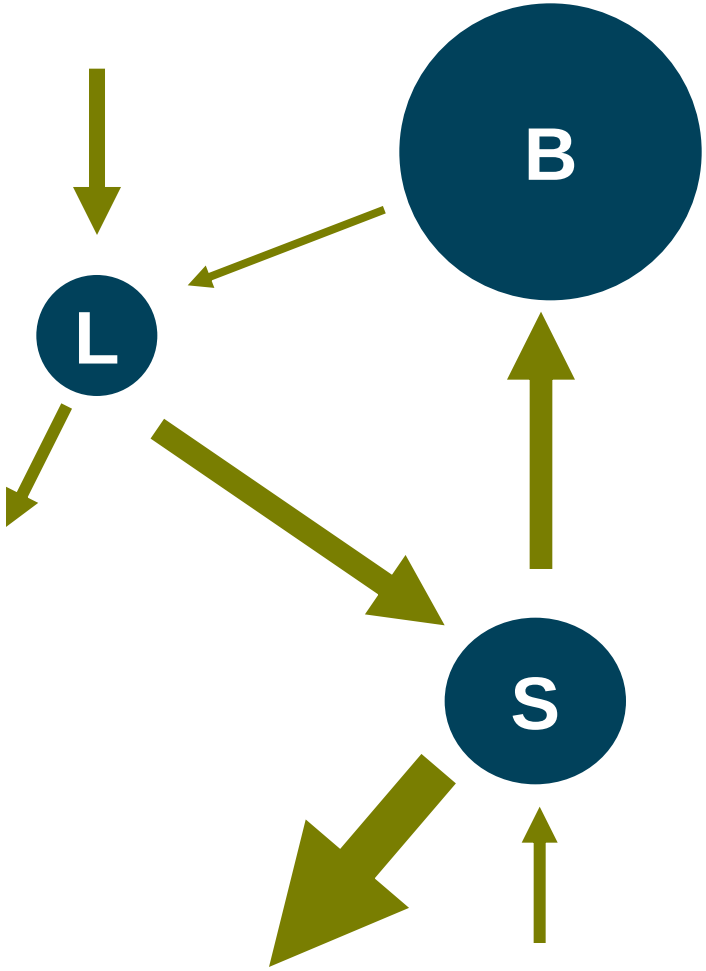

In this example, which is greater:

- Nutrients lost from the biomass through leaf loss or gained through take up from the soil?

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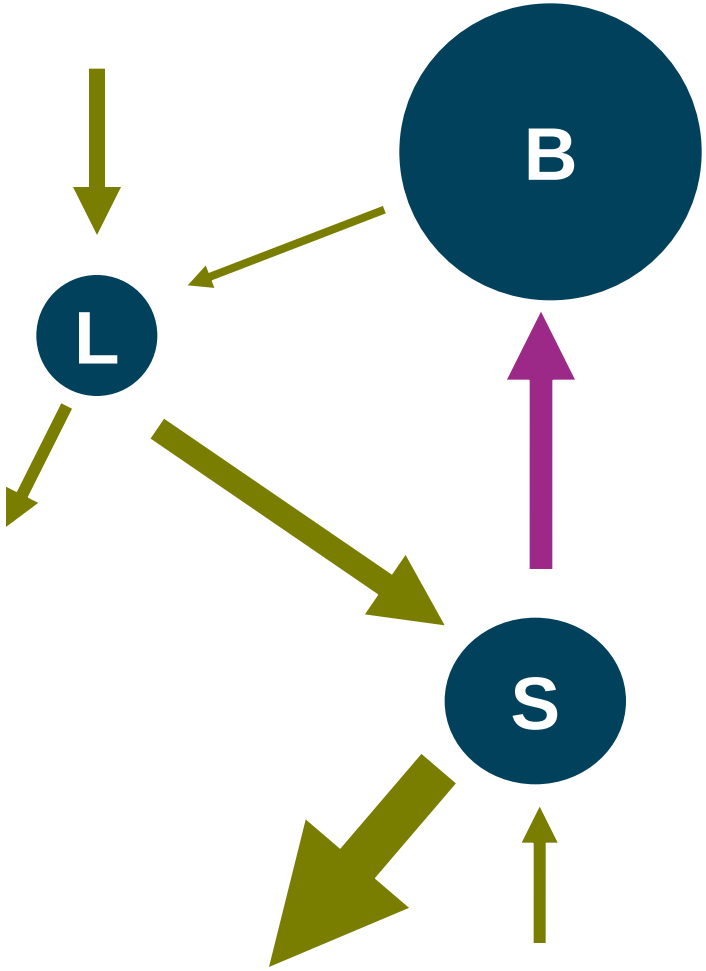

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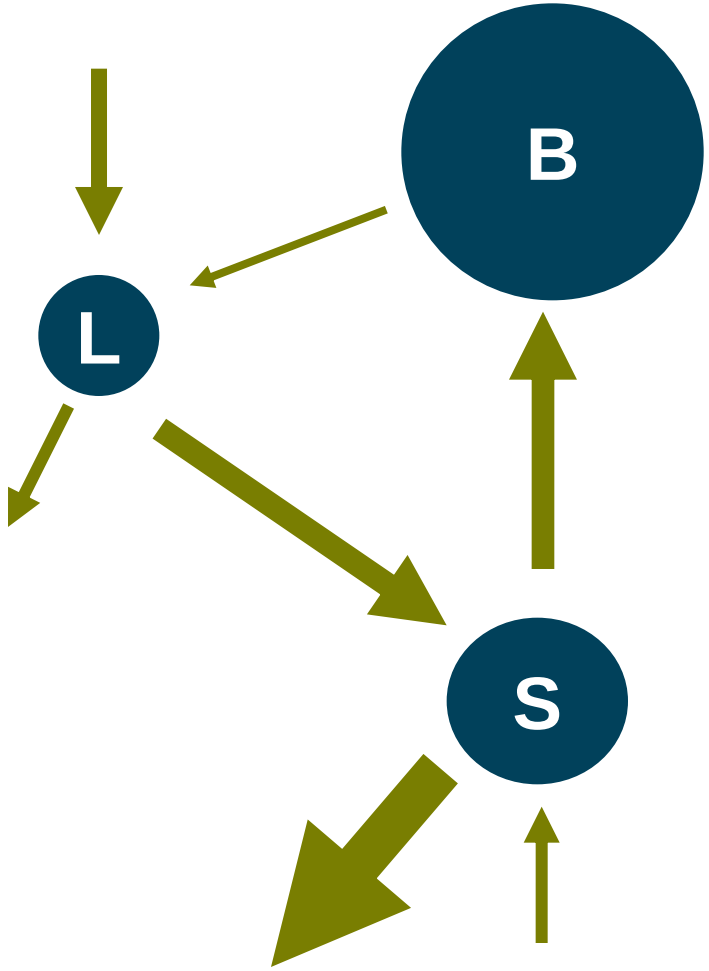

In this example, which is greater:

- Nutrients stored in the trees or in the soil?

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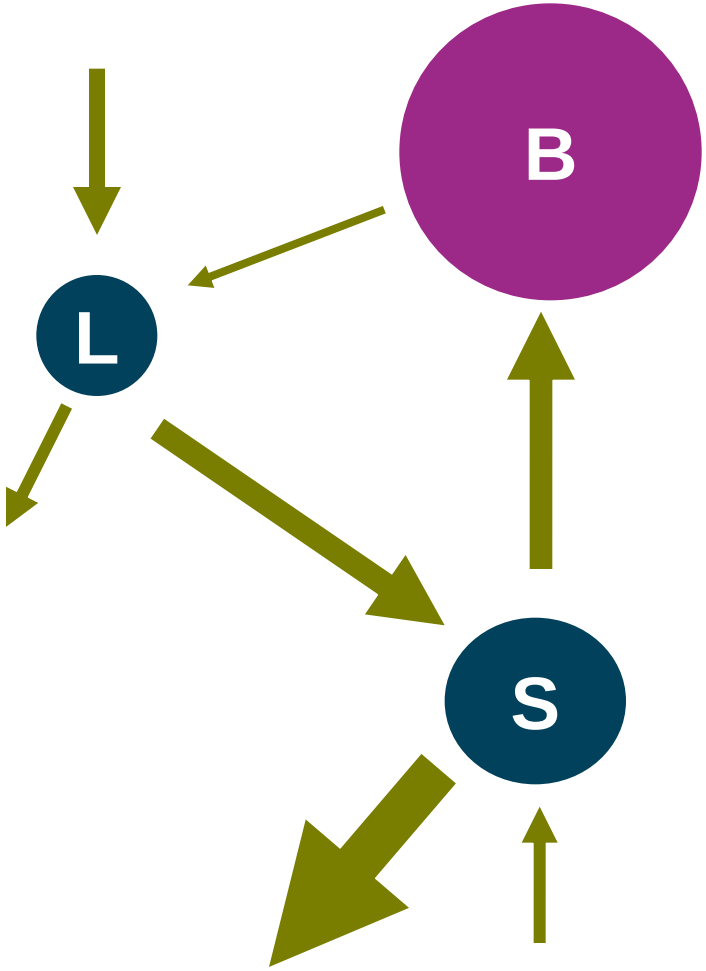

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Match the Biome

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Which description matches the model shown?

a) Coniferous forest in Scandinavia

b) Tropical rainforest in Brazil

c) Grasslands of Central USA

d) None of the above

Ready…?

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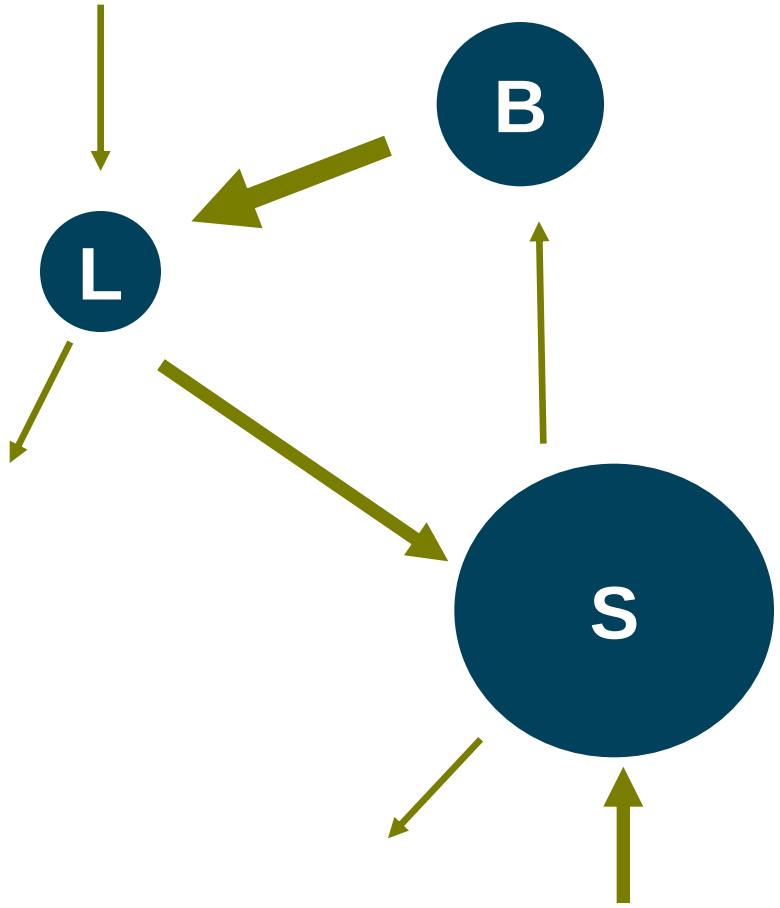

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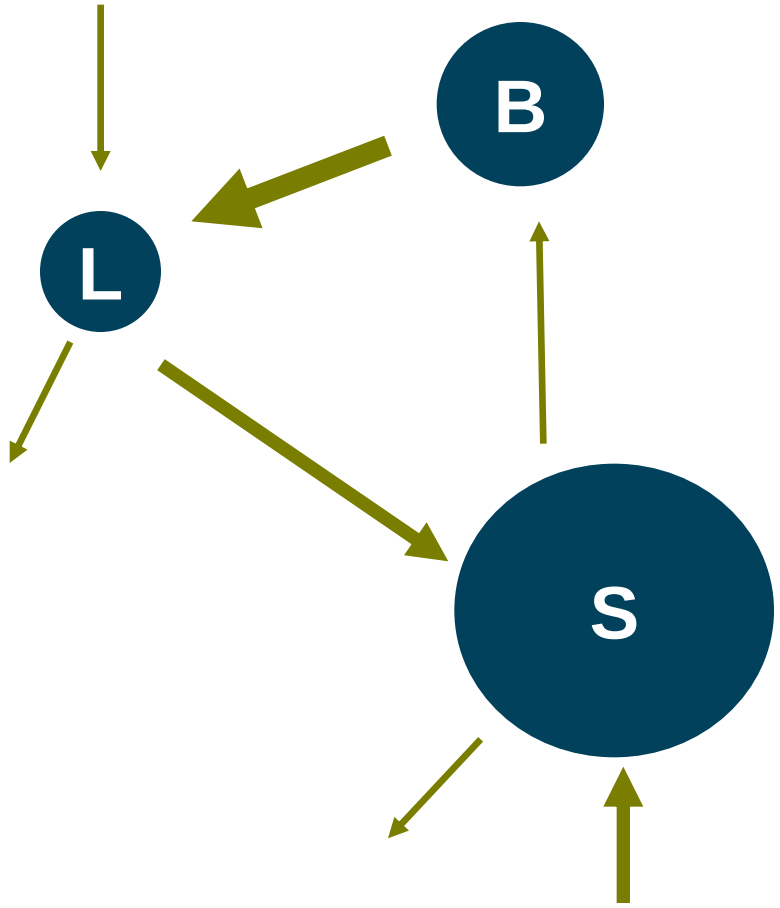

c) Grasslands of Central USA

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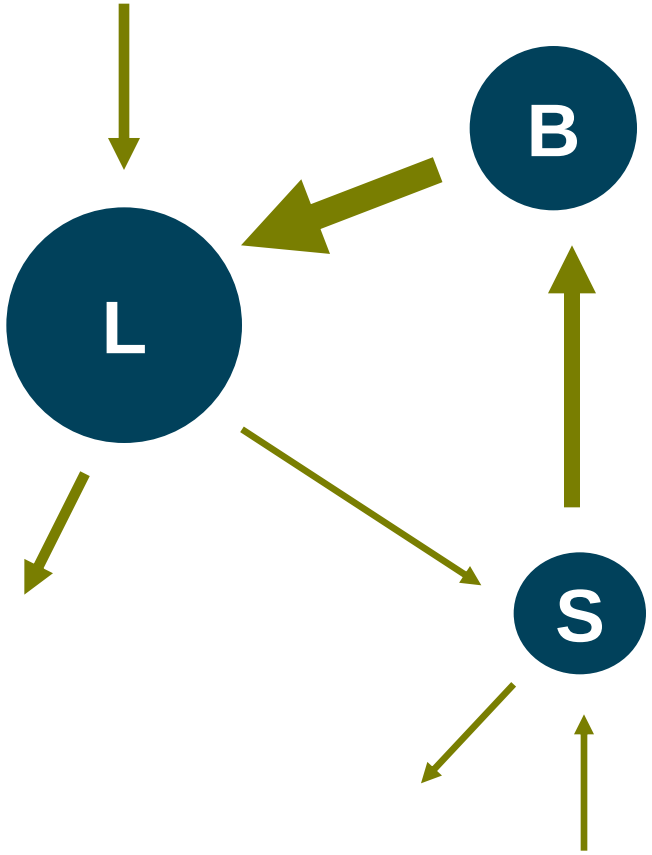

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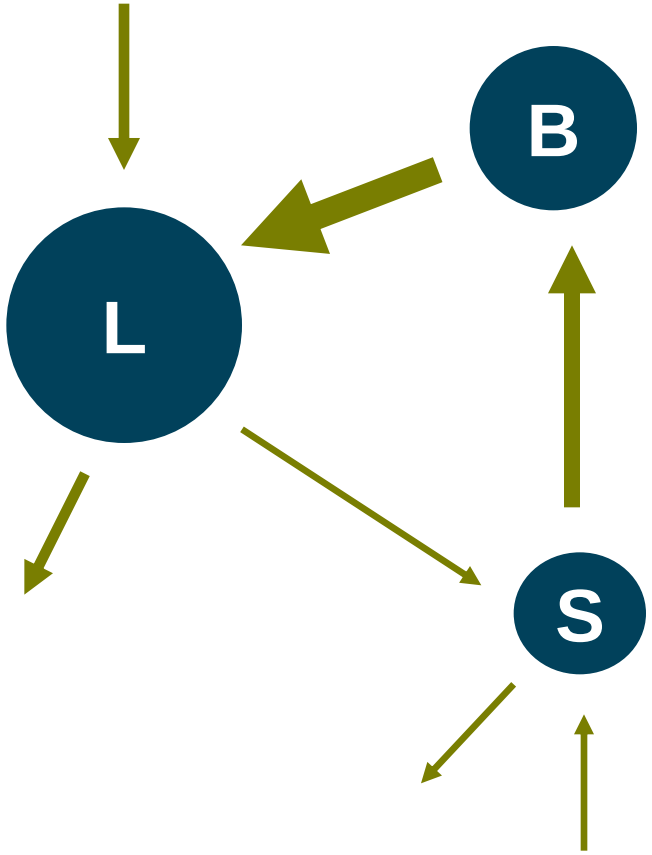

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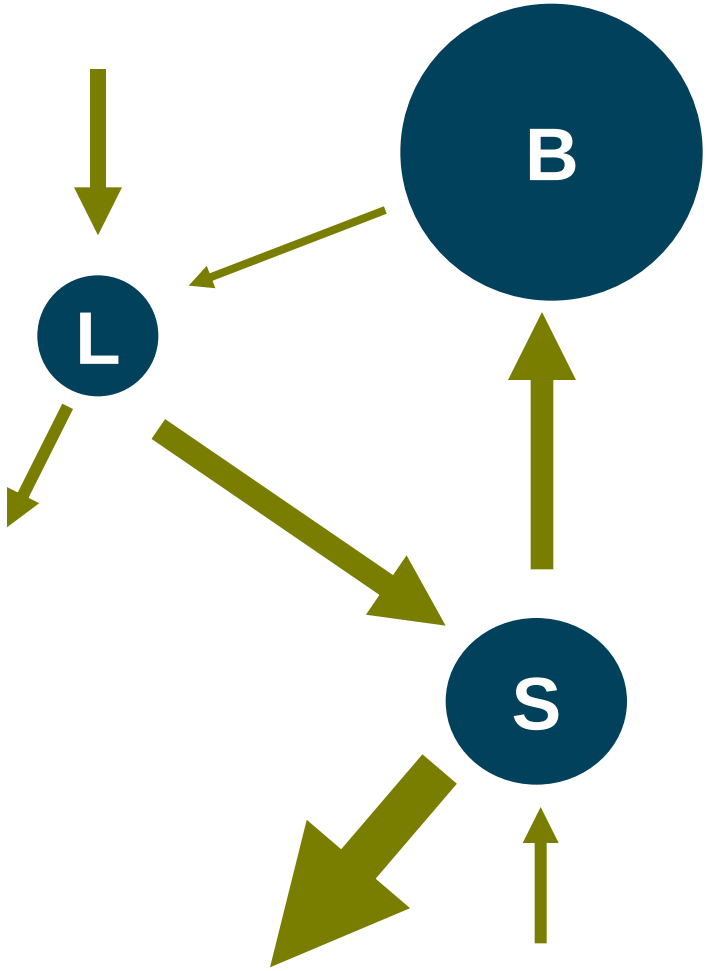

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b) Tropical rainforest in Brazil