

Name: _____

Ecosystems Biology: Recovery of Animal Populations: Gorongosa

An ecosystem is a _____ of different organisms together with the abiotic or _____ components of their environment.

Ecosystems require an input of energy and then flows or is transferred between organisms. The source of energy ultimately is the sun.

There are three roles an organism can play in its ecosystem and energy transfers. What do you think the roles each of the following play are?

- Producers
- Consumers
- Decomposers

Each of these can be further broken down into levels called trophic levels. For example, “Primary consumers” eat mainly producers and are called herbivores, “Second-level consumers” are carnivores that eat the herbivores, and so on.

Food Chain: A simple model of the energy flow from producers to other organisms in the community.

- Using the list of organisms in the supplemental data sheet, create a food chain of four organisms using the spaces below.

GRASS   
Producer

- What do you think would happen to the ecosystem if the amount of grass was reduced? Explain.
- What do you think would happen to the ecosystem if the amount of the secondary consumer was reduced? Explain.

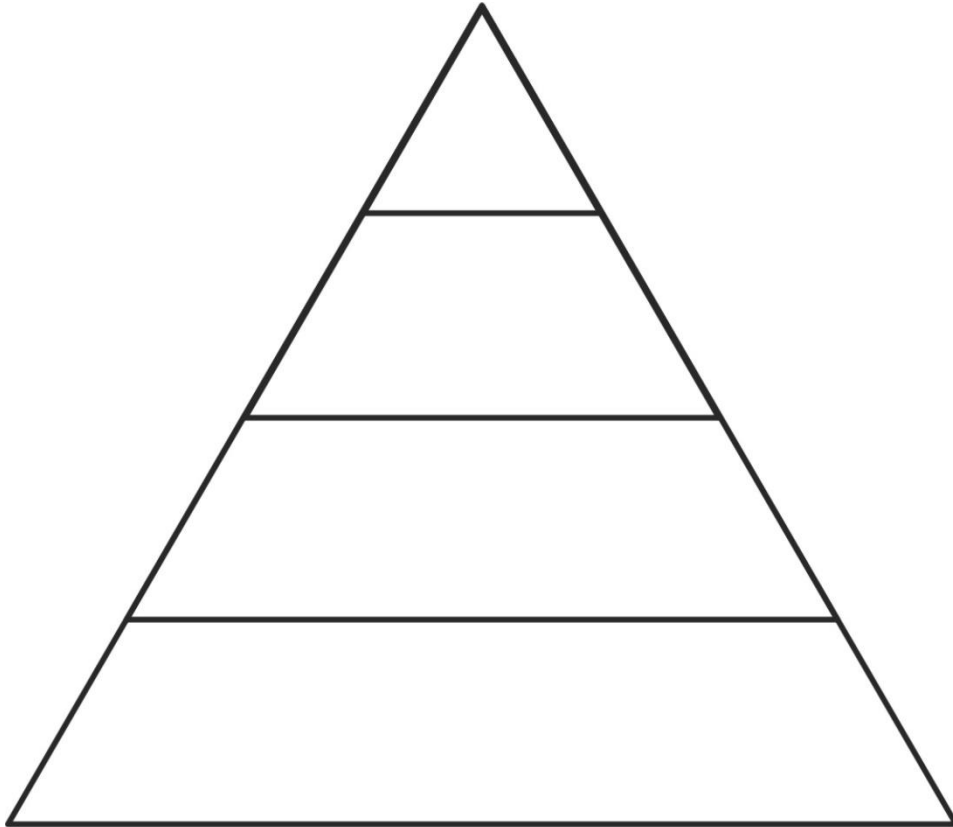
Food chains are simple models that show only a single set of energy-transfer relationships, but many organisms obtain energy from many different sources and in turn may provide energy to several different consumers. A food web illustrates all these interactions and is a more accurate model of how energy moves through an ecological community.

- Starting with your original food chain, add another plant and four more animal cards to construct a food web that shows how energy flows from producers through primary consumers, secondary consumers, tertiary consumers, and possibly a quaternary consumer. Next to each organism, label each organism appropriately to their trophic level.

Only a small fraction of the energy available at any trophic level is transferred to the next trophic level. That fraction is estimated to be about 10 percent of the available energy. The other 90 percent of the energy is needed by organisms at that trophic level for living, growing, and reproducing.

An energy pyramid shows the amount of energy that flows through each trophic levels. The primary producers goes on the bottom.

- Write the names of each organism from your original food web in the correct level of the pyramid below.



- Assuming that your producer level has 3,500,000 kilocalories of energy/area, use the rule of 10 percent in energy transfer to calculate the amount of energy available at each consumer level. Write the energy amount to the left of the pyramid.
- What does an energy pyramid imply about why apex (top) predators in ecosystems are rare?

- Choose one of the disturbance cards, read the information provided, and then make a prediction about how it might impact the food chain you created above.

- Not all disturbances have negative consequences for all trophic levels. Can you think of a possible benefit that one trophic level in your food chain may gain from the disturbance you selected.

ELEPHANT: *Loxodonta africana*

7000 kg

HABITAT: Grasslands, savanna, and woodlands

DIET: Herbivore (browser)

Leaves and fruits from trees and shrubs. Elephants will knock down trees if they cannot reach the leaves. They drink over 50 gallons of water each day.

PREDATORS: Adults have no natural predators.

SOCIAL GROUPS: Related females with their offspring. Males may also form herds or remain solitary.



Elephant

BUFFALO: *Synercus caffer*

500–900 kg

HABITAT: Forests, woodlands, and savanna

DIET: Herbivore (grazer)

Tall, coarse, or green grasses. Their mouths are not well suited for eating very short grass.

PREDATORS: Lions

SOCIAL GROUPS: Large herds of both males and females. Nearby herds sometimes mix; herds tend to merge in the wet season and break apart during the dry season.



Buffalo

KUDU: *Tragelaphus strepsiceros*

270 kg

HABITAT: Woodlands, grasslands, and savanna

DIET: Herbivore (browser)

Leaves, fallen fruits, and young grasses.

PREDATORS: Lions, hyenas

SOCIAL GROUPS: Small groups of females and their offspring. Males can be in small bachelor herds. During the rainy season males may live as single bulls.



Kudu

WARTHOG: *Phacochoerus africanus*

45–150 kg

HABITAT: Woodlands, savanna

DIET: Omnivore

Grasses, roots, berries, bark, fungi, insects, and occasionally small mammals, birds, reptiles, and eggs.

PREDATORS: Lions, hyenas, and crocodiles

SOCIAL GROUPS: Groups of related females and their offspring. Males can form groups until they reach about four years old, then they are solitary.



Warthog

LION: <i>Panthera leo</i>	150–250 kg
HABITAT: Grasslands, savanna, and woodlands	
DIET: Carnivore Wildebeest, buffalo, and zebra. Will prey on smaller antelopes and warthogs if other food is not available.	
PREDATORS: None	
SOCIAL GROUPS: Prides of related females, their offspring, and one or two males.	



Lion

WILDEBEEST: <i>Connachaetes taurinus</i>	120–270 kg
HABITAT: Grasslands, savanna	
DIET: Herbivore (grazer) Prefer short, green grass. Often feed on grass patches that have been “mowed” short by buffalo or zebra, as well as on green grass that has regrown after a fire.	
PREDATORS: Lions, hyenas	
SOCIAL GROUPS: Medium to large herds, sometimes hundreds of individuals.	



Wildebeest

ZEBRA: <i>Equus quagga crawshayi</i>	up to 350 kg
HABITAT: Grasslands	
DIET: Herbivore (grazer) Tall, coarse, or green grasses. Can eat grasses of lower nutritional value than other herbivores.	
PREDATORS: Lions, hyenas	
SOCIAL GROUPS: Small groups including one male, several females, and their offspring.	



Zebra

IMPALA: <i>Aepyceros melampus</i>	61 kg
HABITAT: Grasslands, savanna	
DIET: Herbivore (grazer/browser) Prefer green grasses but will browse on leaves, shoots, pods, and fallen dry leaves.	
PREDATORS: Lions, hyenas	
SOCIAL GROUPS: Large herds of females and their offspring dominated by one or two males seasonally. Males live in small bachelor herds nearby.	



Impala

HARE (2 species): <i>Lepus microtis</i> <i>Lepus saxatillis</i>	2 kg
HABITAT: Woodlands, savanna	
DIET: Herbivore Leaves, roots, berries, fungi, bark, and twigs.	
PREDATORS: Birds of prey, servals	
SOCIAL GROUPS: Solitary except when nursing their young.	



Hare

VULTURE (5 species)	<i>Family: Accipitridae</i>	7–9 kg
HABITAT: Savanna, grasslands		
DIET: Carnivore (scavenger) Carrion (dead animals).		
PREDATORS: None		
SOCIAL GROUPS: May live singly or in colonies. They feed in large groups.		



Vulture

INSECTS (many species)	<i>Class: Insecta</i>	Size varies greatly
HABITAT: Woodlands, grasslands, savanna, desert, and marshlands		
DIET: Omnivore Plants, carrion, other insects, and animals.		
PREDATORS: Birds, rodents, lizards, mammals, and other insects.		
SOCIAL GROUPS: Varies greatly.		



Insects



Tall Grass

SERVAL: <i>Leptailurus serval</i>	13 kg
HABITAT: Grasslands, savanna, and marshlands	
DIET: Carnivore Rats, mice, and other rodents, along with small birds.	
PREDATORS: Hyenas	
SOCIAL GROUPS: Solitary and territorial.	



Serval

SHREW (8 species)	Families: <i>Soricidae</i> <i>Macroscelididae</i>	~50 g
HABITAT: Desert to grasslands and forests		
DIET: Omnivore Insects, spiders, worms, and occasionally small amounts of plant matter, seeds, and small fruits.		
PREDATORS: Snakes, lizards, birds of prey, and small carnivorous mammals.		
SOCIAL GROUPS: Usually monogamous pairs. Offspring leave the nest after about 40 days.		



Shrew

AFRICAN FISH EAGLE: <i>Haliaeetus vocifer</i>	3–4 kg
HABITAT: Freshwater lakes, rivers, and streams near savanna and grasslands	
DIET: Carnivore Fish, other waterfowl, turtles, baby alligators, and small mammals.	
PREDATORS: None	
SOCIAL GROUPS: Live as breeding pairs.	



Eagle



Short Grass



Small Trees/Shrubs

Drought

Annual cycles of flood and drought shape the flora and fauna of Gorongosa National Park. During the dry months of July through September, the rivers and lakes begin to dry up and water sources are concentrated at watering holes that become hotbeds for animals. Plants, especially grasses, grow more slowly, or not at all, and competition among animals for green foliage increases. The rainy season replenishes the water in Gorongosa's lakes and rivers, and green, nutritious vegetation is abundant.



Drought

Agriculture and Deforestation

Forests in and around Gorongosa are primarily cleared by local farmers for agriculture. Deforestation removes essential habitat for many forest-dwelling animals, such as birds, reptiles, small mammals, and browsing antelope. Deforestation in the higher elevations of Mount Gorongosa affects the seasonal pattern of runoff because the soil is less able to absorb moisture, so precipitation runs off immediately rather than gradually throughout the year.



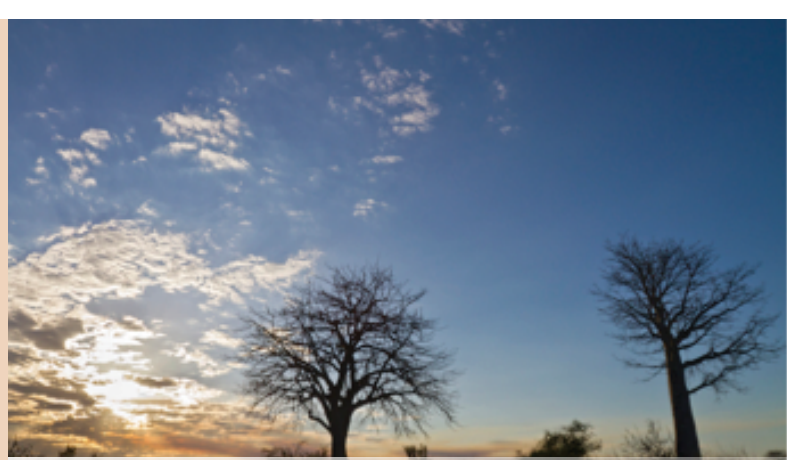
Agriculture and Deforestation

War

A civil war raged from 1977 to 1992 in the Gorongosa region. Battles, violent raids on villages, and massacres occurred throughout the country, including in the park and around Mount Gorongosa. Soldiers and farmers decimated the populations of large animals, like lion, elephant, zebra, buffalo, and wildebeest, destroying their habitat and hunting them for food.



War



Large Trees

Fires

Gorongosa's large, open grasslands and savannas depend on naturally occurring fires and heavy grazing by herbivores. Without fire or grazing, grasslands are quickly invaded by shrubby and woody vegetation, depriving many of Gorongosa's grazers of prime feeding areas. Fires release nutrients and remove old, dry grasses above ground, allowing new growth to sprout from the roots when the rains arrive. These areas of lush, green regrowth provide prime feeding grounds for many of Gorongosa's grazers, including zebra, wildebeest, and African buffalo.



Fires

Increasing Human Population

The population in Mozambique, whose livelihood largely depends on agriculture, has increased more than threefold in the roughly five decades since Gorongosa National Park was established. As a result, animals like elephants, buffalo, wildebeest, and other grazers can no longer roam large swaths of land to find food and locate mates. Traditional migration routes are often blocked by villages, roads, and farms. Increased human populations can also increase poaching of animals of all sizes. Animals confined to smaller habitats can become crowded and stressed, and therefore more likely to fall prey to diseases and parasites.



Increasing Human Population

Tourism

People from all over the world travel to see African animals, and charismatic animals like lions and elephants are often seen as celebrities. Tourist infrastructure can negatively impact some habitats, but the money that tourism brings is an essential resource for park managers and to support a sustainable economy for communities around the park.



Tourism