Where the Wild Things Are: How Rainfall Drives Food Web Interactions

Every organism, large and small, is affected by the weather. Some organisms like plants are affected directly by rainfall. Others are impacted through their food chain relationships. In wet-dry tropics found in some parts of Africa, seasonal patterns of rainfall drive one of the most impressive animal migrations in the world. Every year 1.3 million wildebeest, 200,000 zebra, and 300,000 Thompson's gazelle migrate roughly 1,500 miles from the African Serengeti in Tanzania to the Masai Mara in Kenya and back again. In this exercise students will accomplish the following:

- Review the water cycle and food web terminology (producer, herbivore, carnivore)
- Explain how changes in the water cycle cause the wet and dry season in Africa
- Illustrate how every animal ultimately depends on rainfall/water availability using the African food web
- Illustrate how rainfall changes result in changes in the African food web
- Explain how these food web changes can lead to changes in behavior (migration, increased conflict between carnivores, etc.)
- Explore how human-caused changes can strongly impact the food web patterns

Six-Degrees of Separation

There is a saying that any two humans on earth are only 6 or fewer connections away from each other. In this game students will play African animals that are each within 6 degrees of separation from the seasonal rains. Students will physically build these connections using string to create a network of living food chains. Each student in a group of 10 should choose one of the following characters.

The Cast of Characters

- Wildebeest herd
- Zebra herd
- African savanna hare
- Impala
- Honey badger
- Cheetah
- Spotted hyena
- Lion
- Vulture
- The narrator (this can be the instructor)

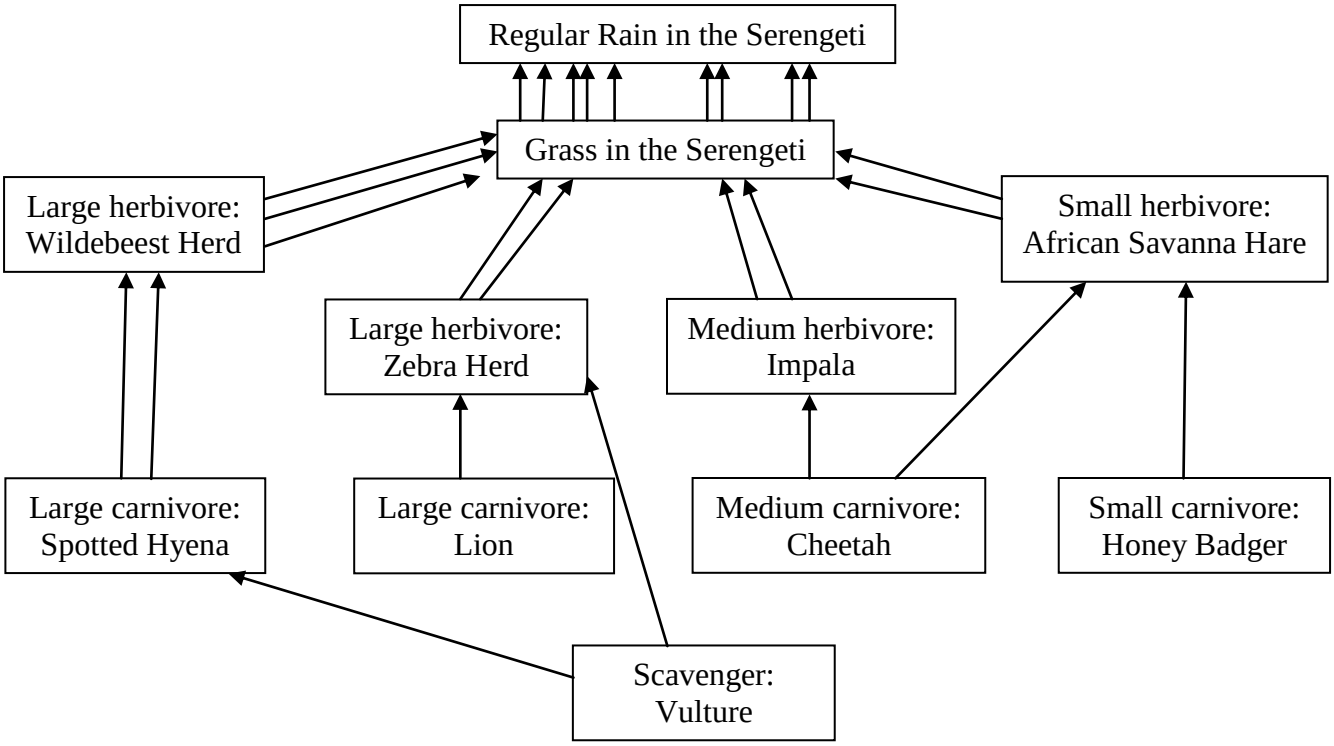
Where the Wild Things Are: Student Worksheet

SCENARIO ONE:

The Wet Season

1. Draw the connections between the animals your group created

ONE SET OF POSSIBLE CONNECTIONS ARE DISPLAYED BELOW

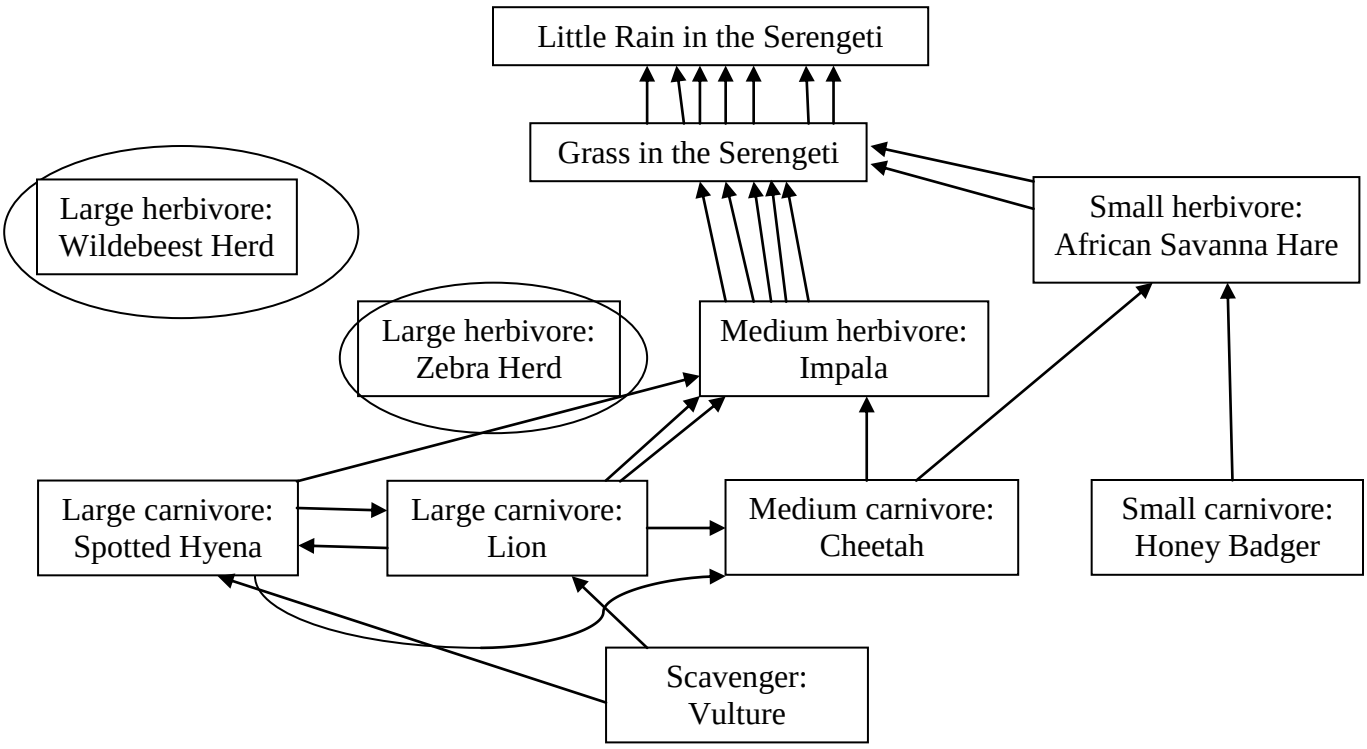


The Dry Season

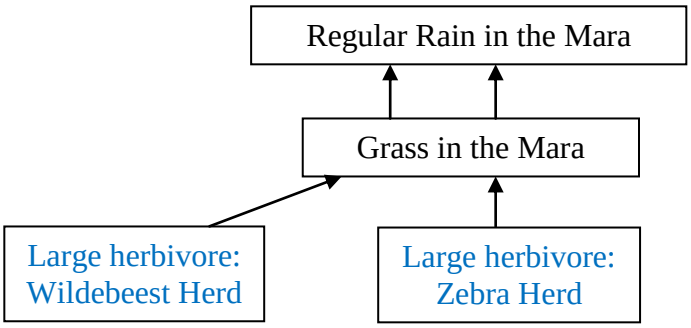
2. Draw the connections between the animals your group created. If an animal chooses to migrate, draw a circle around the box in the Serengeti and redraw it in the Masai Mara.

ONE SET OF POSSIBLE CONNECTIONS BELOW

THE SERENGETI PLAINS



THE MASAI MARA



1. What animals are forced to migrate when the dry season comes? Why?

   Wildebeest and zebra are forced to migrate because they no longer have enough food in the Serengeti.

2. List the food sources of the large carnivores (hyenas and lions):

The Wet Season	The Dry Season
Wildebeest	(list of all possibilities below)
Zebra	Impala
	Steal from cheetah
	Steal from lion/hyena

3. How do the relationships between the carnivores change when the dry season comes?

   Predators in the dry season have more conflicts than in the wet season since they are stealing food from each other to survive. There is also more competition between predators because they are using the same herbivore food sources.

4. How long is the longest connection to rain in the two networks you built?

   4 or 3 (depending on how the connections were actually built).
   (This question is meant for students to realize no animal is ever that far from rain)

5. Suppose climate change dramatically alters the patterns of rain in both the wet and dry season. Which animals will be affected?

   All animals will be affected since they all connect back to rain.

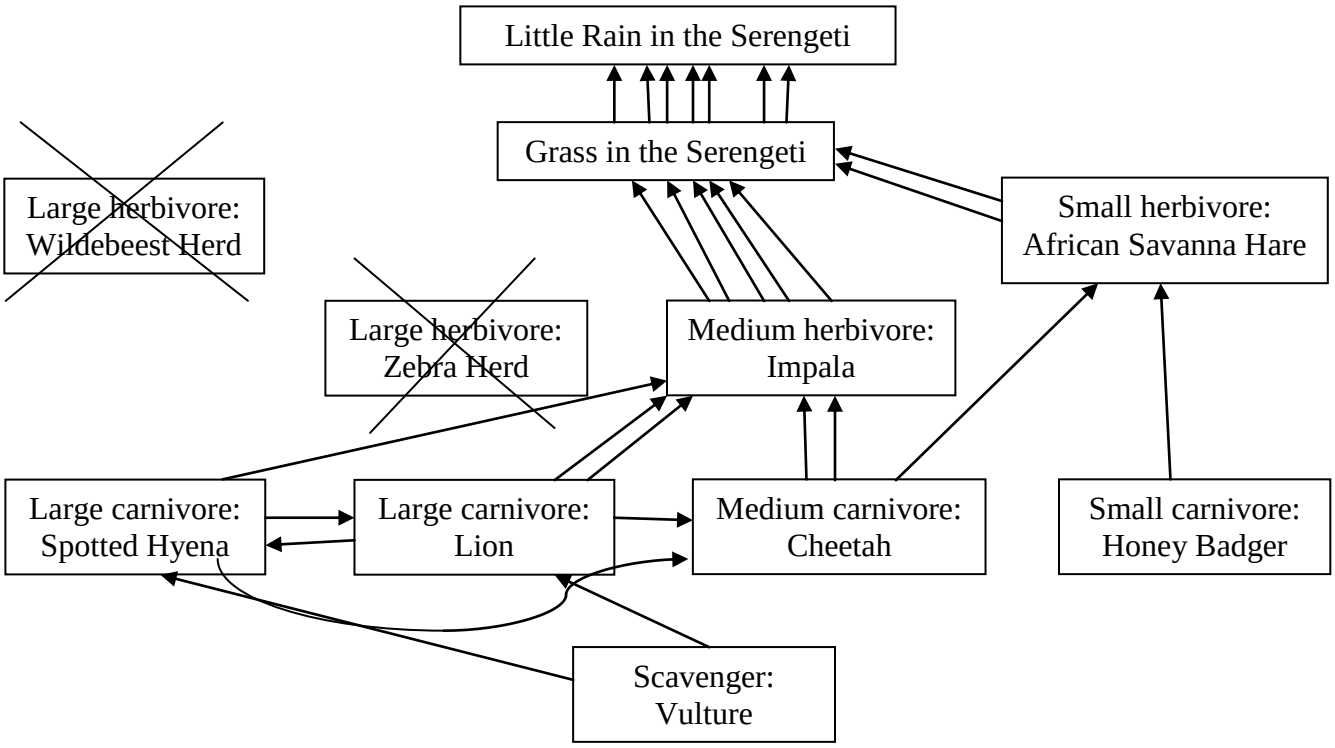
SCENARIO TWO: Walls around Wildlife Reserves

The Dry Season

1. Draw the connections between the animals your group created during the dry season. If an animal goes extinct, cross it out with an X.

ONE SET OF POSSIBLE CONNECTIONS BELOW

THE SERENGETI PLAINS



THE MASAI MARA

Regular Rain in the Mara

Grass in the Mara

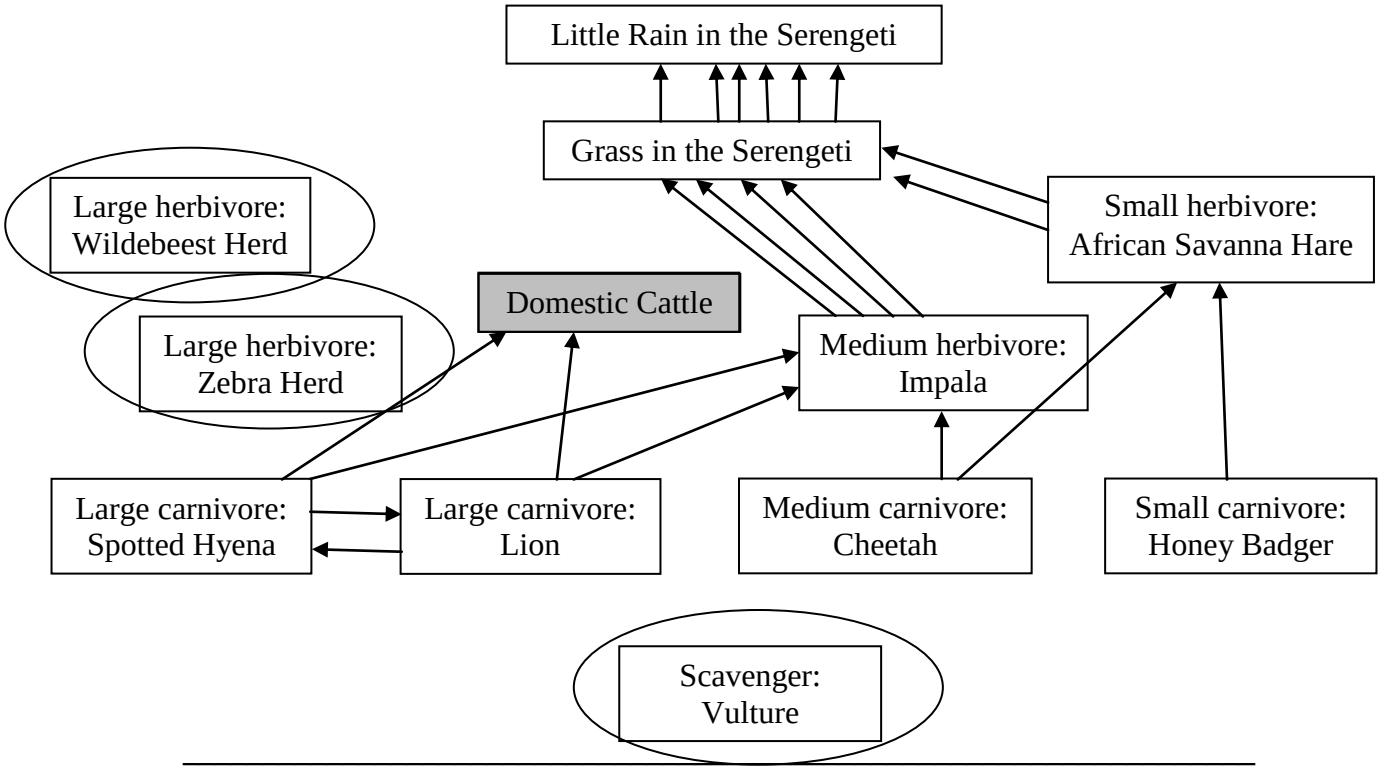
SCENARIO THREE: Human-Animal Conflicts

The Dry Season

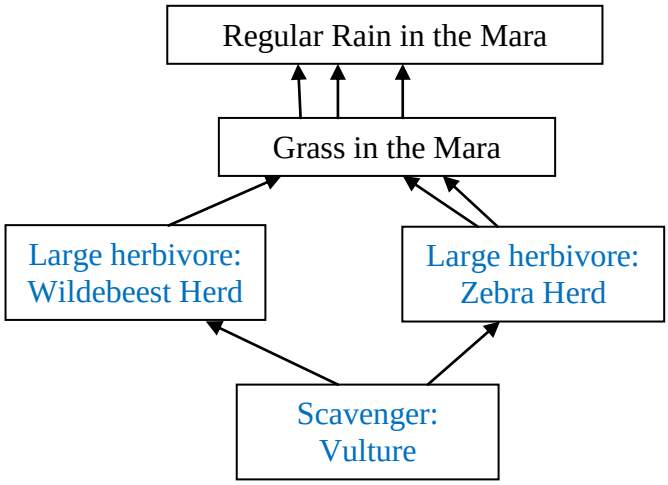
1. Draw the connections between the animals your group created during the dry season. If an animal chooses to migrate, draw a circle around the box in the Serengeti and redraw it in the Masai Mara. If an animal goes extinct, cross it out with an X.

ONE SET OF POSSIBLE CONNECTIONS BELOW

THE SERENGETI PLAINS



THE MASAI MARA



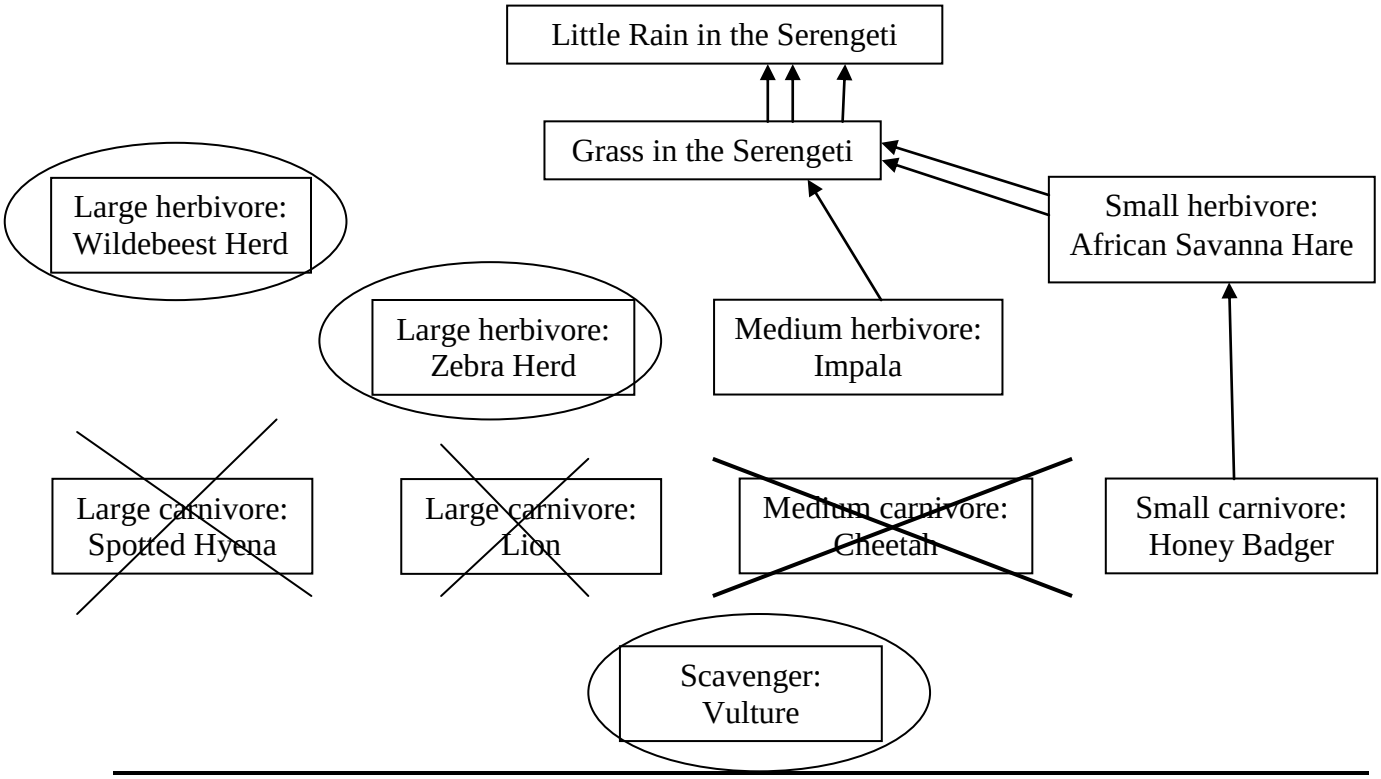
SCENARIO FOUR: the Extinction of the Cheetah

The Dry Season

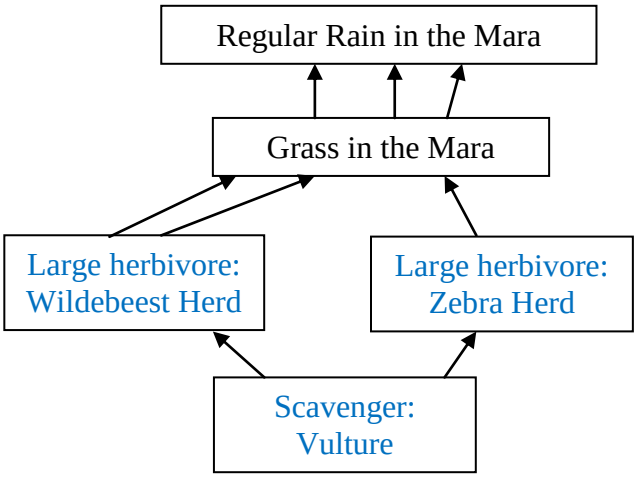
1. Draw the connections between the animals your group created during the dry season. If an animal chooses to migrate, draw a circle around the box in the Serengeti and redraw it in the Masai Mara. If an animal goes extinct, cross it out with an X.

ONE SET OF POSSIBLE CONNECTIONS BELOW

THE SERENGETI



THE MASAI MARA



SCENARIO TWO Questions

1. What animals go extinct if you put walls around wildlife reserves in the Serengeti?

   Wildebeest and zebra

2. What would happen to carnivores that live in the Masai Mara (not on your network) if you put walls around wildlife reserves in the Serengeti?

   Carnivores in the Masai Mara might also go extinct/have trouble and increased competition because they don't receive the huge influx of food when the migratory herds arrive.

3. If these animals are now permanently removed from the food web, how do you think the other animals in the Serengeti might be affected years down the road?

   Down the road more animals may go extinct/face food shortages. Carnivores will be in conflict for the whole year (instead of just the dry season) which may result in more deaths from fighting. Impalas will be heavily hunted all year long (instead of receiving a break when the migratory herds come through in the wet season). This could lead to impala population declines which will ripple through the food chain.

4. How would you design your wildlife reserve if you were manager interested in protecting the African wildebeest?

   To design a proper reserve you would need to preserve areas in both the Serengeti and Masai Mara and/or build a wildlife corridor between the two areas and/or not put permanent boundaries around your reserves so the animals can still move freely.

SCENARIO THREE: Human-Animal Conflict

1. How do human-animal conflicts change between the wet and dry season?

   Human-animal conflicts increase in the dry season

2. Which animals might benefit from the fact that hyenas and lions can eat domestic cattle in the dry season?

   Answers vary depending on the exact networks that were built. One of the old targets of lions and hyenas (impalas, cheetah, lions/hyenas) should be facing less pressure now that cattle are a food source.

SCENARIO FOUR: the Extinction of the Cheetah

1. Which animals go extinct if cheetahs are no longer in the food web?

   Hyenas and lions will go extinct

2. Using this exercise, explain why preserving biodiversity in ecosystems like the Serengeti is important.

   Answers may vary. Ecosystems are very interconnected. The extinction of key species (like cheetahs or wildebeest) will have negative effects on all other animals that depend on those species.