

Investigating Science Practices in Serengeti: Nature's Living Laboratory

INTRODUCTION

In this activity, you will use several important and interconnected **science practices**: approaches that scientists use to investigate the world. You'll also learn how these practices were used by several scientists, such as Tony Sinclair and Simon Mduma, to better understand the ecosystem of Serengeti National Park in Tanzania, Africa. The practices you will explore are essential in science, engineering, and many other fields.

For this activity, you should have two sets of cards from your instructor: **SEP cards**, which describe different science practices, and **CCC cards**, which describe different crosscutting concepts (concepts that apply across all fields of science). You will use these cards to reflect on the practices and concepts that you and the scientists are using.

SCIENCE PRACTICE: Asking Questions and Defining Problems

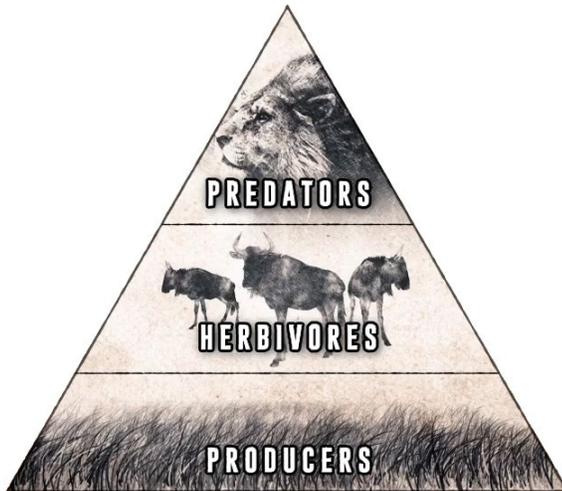
Tony Sinclair observed wildlife populations in the Serengeti. Watch this [video clip](#), which shows some of the many observations made by Sinclair and other scientists.

1. What were some of your questions as you watched this video? Write at least three questions that could be studied in the Serengeti.
 - 1)
 - 2)
 - 3)
2. Do you think that some of the scientists in the video asked similar questions? If so, what do you think may have been their motivation for asking these questions?
3. What problems could be studied based on the scientists' observations in the Serengeti?
4. Which science practices (SEP cards) did you and the scientists in the video use to complete this task?
5. Which crosscutting concepts (CCC cards) were apparent when completing this task?

6. What could be done next to figure out or learn more about the questions/problems described above? Identify which of the science practices you would move to next to continue figuring out the problems presented.

SCIENCE PRACTICE: Developing and Using Models

Observe this image, which shows three major groups of organisms in the Serengeti. The “Herbivores” group in the middle includes wildebeest.

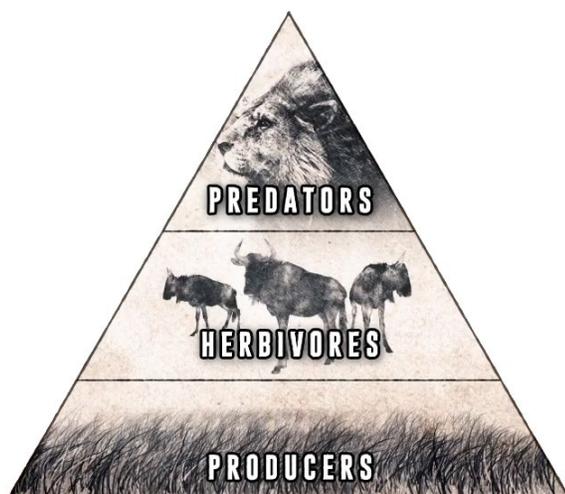


1. How might the wildebeest population be impacted by the other organisms in the image?
2. Develop a model of the interactions among the organisms in the image. Explain the model that you developed in writing below. Some suggestions for creating models include:
 - adding labels or symbols directly to the image on this page
 - drawing a new image on another page
 - using shapes/pictures from a software program

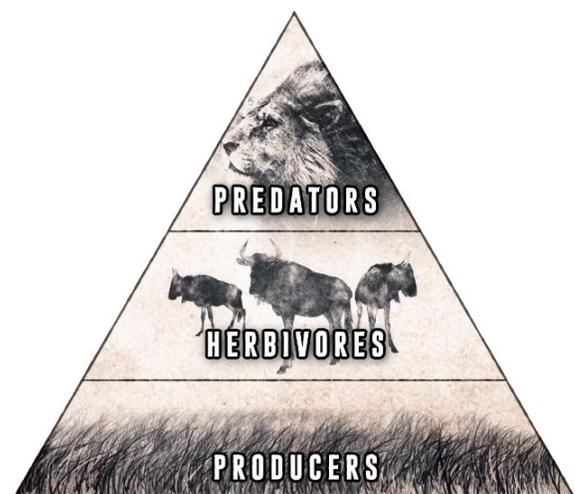
Simon Mduma studied interactions among organisms in the Serengeti. Watch this [video clip](#), in which he discusses two possible models of what regulates wildebeest populations.

3. Develop the two models of wildebeest regulation. Include labels that help explain how each model works in this ecosystem. You can use the same methods as in Question 2 to create your model.

Model 1



Model 2



SCIENCE PRACTICE: Planning and Carrying Out Investigations

Simon Mduma and Tony Sinclair wanted to figure out how wildebeest populations in the Serengeti were being regulated. Watch this [video clip](#), in which Mduma describes his investigation.

1. Which two limiting factors were thought to possibly regulate wildebeest populations?

2. What question was Mduma trying to answer through this investigation?

3. Describe each step that Mduma took in this investigation, and why that step was important.

Step in the investigation	Why was this step important?

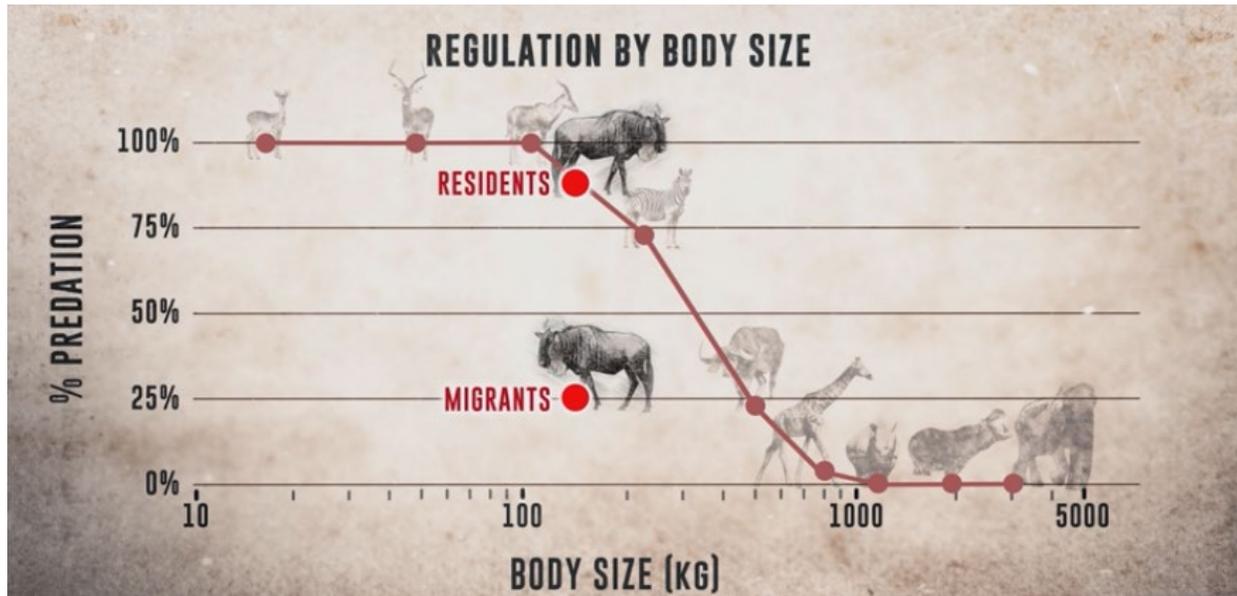
4. Which science practices (SEP cards) did you and the scientists in the video use to complete this task?

5. Which crosscutting concepts (CCC cards) were apparent when completing this task?

6. What should be done next to figure out or learn more about the questions/problems described above? Identify which of the science practices you would move to next to continue figuring out the problems presented.

SCIENCE PRACTICE: Analyzing and Interpreting Data

Scientists have collected large amounts of data on the Serengeti, some of which is shown in the following graph.



1. What patterns do you notice in the graph?
2. Why do you think both the resident wildebeests and those that migrate were included on this graph?
3. Explain the relationship(s) in the data using the patterns you identified.

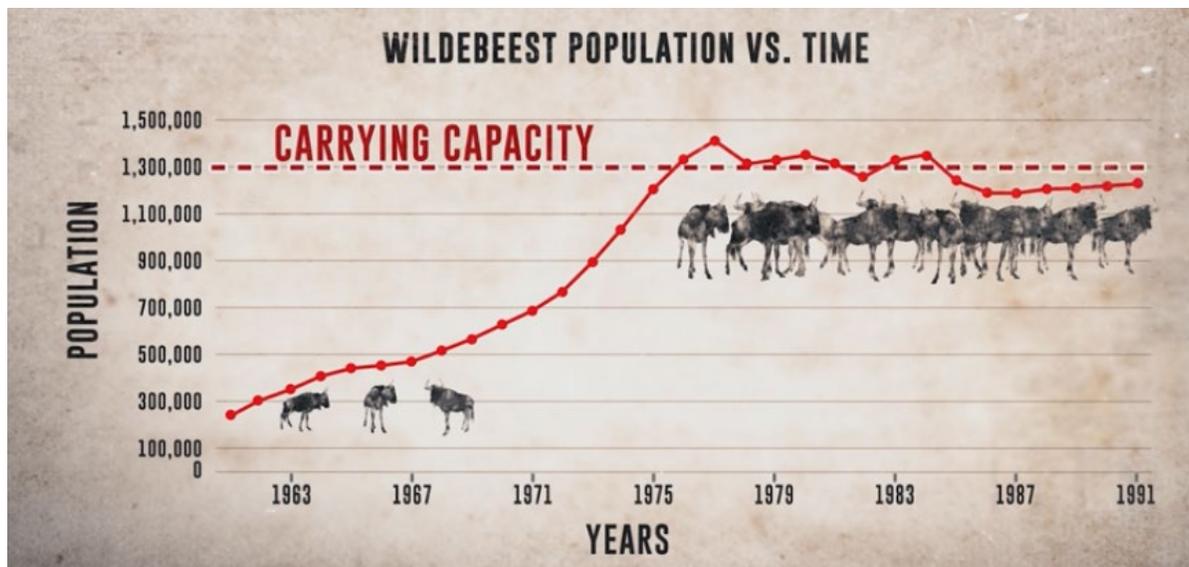
Watch this [video clip](#), which describes the data shown in the graph in more detail.

4. What new questions do you have after viewing the video?
5. Which science practices (SEP cards) did you and the scientists in the video use to complete this task?
6. Which crosscutting concepts (CCC cards) were apparent when completing this task?
7. What should be done next to figure out or learn more about the questions/problems described above? Identify which of the science practices you would move to next to continue figuring out the problems presented.

SCIENCE PRACTICE: Using Mathematics and Computational Thinking

Wildebeest in the Serengeti have been tracked over many years. Watch this [video clip](#), which discusses how the wildebeest population changed over several decades.

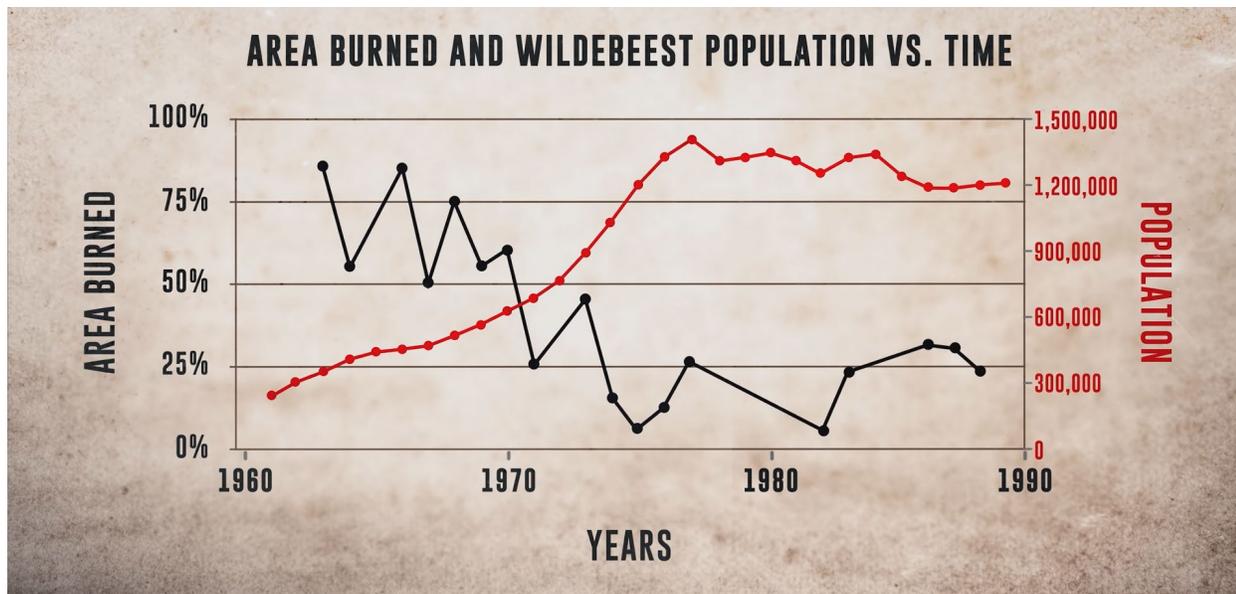
This graph shows some more data on the population.



1. By what percentage did the wildebeest population increase from 1961 to 1977?
2. Based on the graph, what is the carrying capacity for this population?
3. How do you think scientists determined the population's carrying capacity? Provide evidence from the video and/or the graph to support your reasoning.
4. What do you think would happen to the carrying capacity if there was a severe drought in this area? Explain your thinking.
5. Which science practices (SEP cards) did you and the scientists in the video use to complete this task?
6. Which crosscutting concepts (CCC cards) were apparent when completing this task?
7. What should be done next to figure out or learn more about the questions/problems described above? Identify which other science practices (SEP cards) could be used to continue the investigation.

SCIENCE PRACTICE: Constructing Explanations and Designing Solutions

This graph shows two data sets collected over the same time period in the Serengeti. The first data set is for the percentage of area burned by naturally occurring wildfires. The second data set is for the size of the wildebeest population.



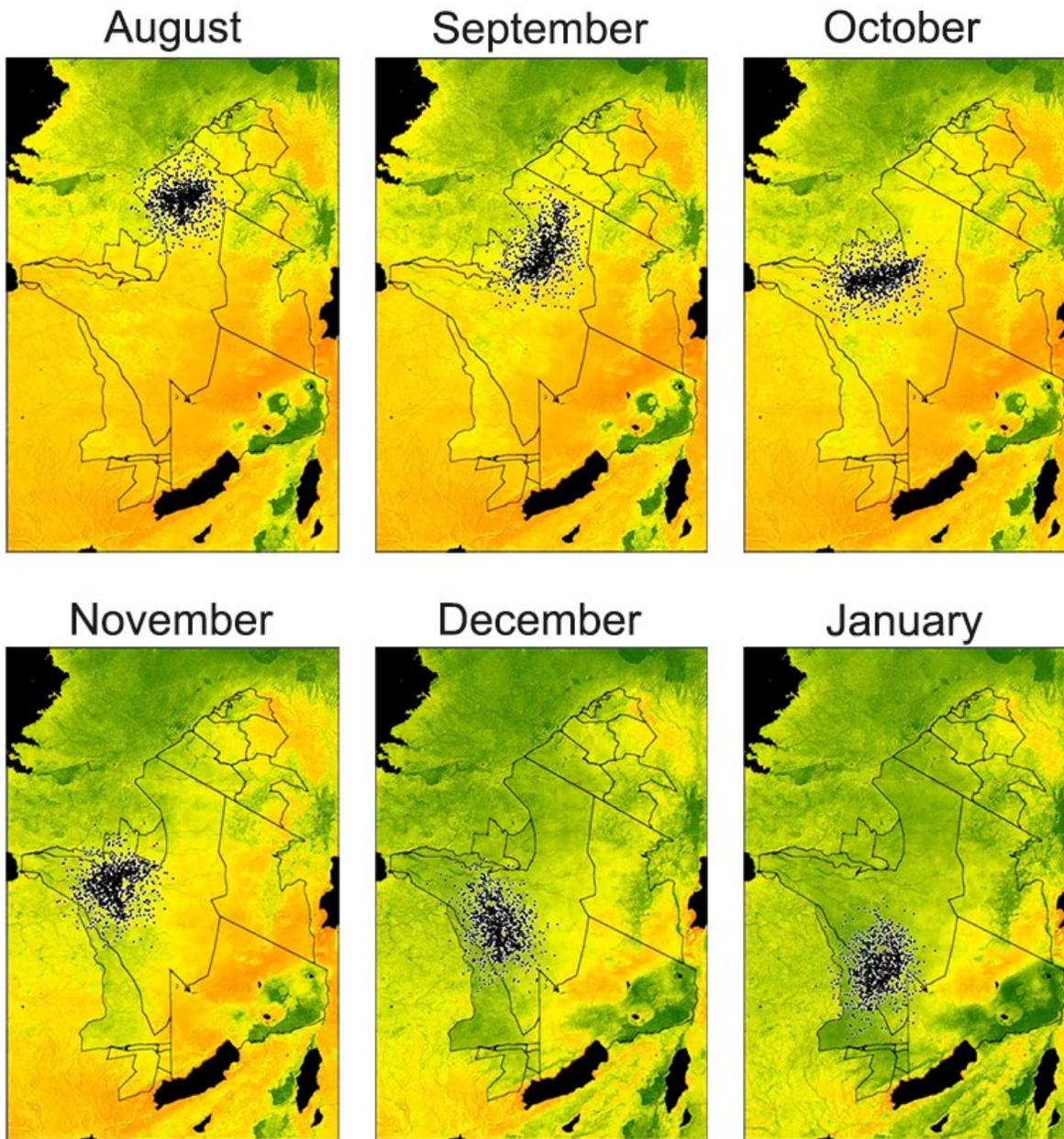
1. Explain what this data tells you, identifying any relationships shown.

Watch this [video clip](#), which provides additional information about this phenomenon.

- Based on the video, construct an explanation of the relationship between wildebeest and wildfires.
- How could understanding this relationship help people manage wildfires?
- Which science practices (SEP cards) did you and the scientists in the video use to complete this task?
- Which crosscutting concepts (CCC cards) were apparent when completing this task?
- What should be done next to figure out or learn more about the questions/problems described above? Identify which of the science practices you would move to next to continue figuring out the problems presented.

SCIENCE PRACTICE: Engaging in Argument from Evidence

Scientists have tracked the movements of wildebeest in the Serengeti over time. These monthly maps show some of the data they have collected. In these maps, black dots represent the wildebeest, green areas represent land with more vegetation, and orange areas represent land with less vegetation.



1. Based on these data, create an argument that predicts why you think these wildebeest migrate the way they do.

Watch this [video clip](#), which provides additional information on wildebeest migration.

2. One argument is that wildebeest must migrate to support their large populations. Support this argument using **three** pieces of evidence from the video and maps. Provide reasoning for how each piece of evidence supports the argument.

Evidence	Reasoning (how the evidence supports the argument)

3. Which science practices (SEP cards) did you and the scientists in the video use to complete this task?

4. Which crosscutting concepts (CCC cards) were apparent when completing this task?

5. What should be done next to figure out or learn more about the questions/problems described above? Identify which of the science practices you would move to next to continue figuring out the problems presented.

SCIENCE PRACTICE: Obtaining, Evaluating, and Communicating Information

Watch this [video clip](#). At one point, Tony Sinclair describes several projects that different scientists were working on in the Serengeti.

1. What different aspects of the Serengeti were the scientists studying?
2. Why was it critical for the scientists to review each other's work even though they were studying different things?
3. How does the video emphasize the importance of communication in science?
4. Which science practices (SEP cards) did you and the scientists in the video use to complete this task?
5. Which crosscutting concepts (CCC cards) were apparent when completing this task?
6. What should be done next to figure out or learn more about the questions/problems described above? Identify which other science practices (SEP cards) could be used to continue the investigation.