

OVERVIEW

This worksheet complements the short video "<u>Niche Partitioning and Species Coexistence</u>" from the *Scientists at Work* series.

PROCEDURE

- 1. Prior to watching the film, read the questions below.
- 2. Watch the film.
- 3. If working with a partner or in a small group, discuss and answer the questions below. If working alone, think about and answer the questions below.

QUESTIONS

- 1. List two pieces of evidence from the film justifying the claim that "termite mounds are an advantage to the savanna ecosystem."
- 2. Define the term *niche*:
- 3. The film states that "Ecological theory predicts, 'to coexist, each species must occupy a unique niche." Based on your definition in the above question, explain this prediction in two sentences.
- 4. Technology has changed the way scientists do research. Provide three pieces of evidence from the film to support the claim that "Technology is crucial for Dr. Pringle's species coexistence research in Gorongosa National Park."
- 5. Dr. Pringle states in the film, "Plant diversity and the presence of termite mounds help maintain large mammal diversity." Provide two pieces of evidence from the film (one about plant diversity and one about termite mounds) to justify this claim.

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6. Dr. Pringle is using DNA metabarcoding, summarized here:



- a. Provide two reasons why it is important to isolate undigested plant cells.
- b. In order to use this DNA technique, the research team first collected DNA from 400 plant species that grow on the African savanna and entered the sequence data into a database. Explain why this was a necessary first step.
- 7. Toward the end of the film, the narrator says, "The Pringle lab's work reminds us that ecological communities are profoundly interconnected." Using sentences, describe three specific examples of the interconnectedness of the organisms found in Gorongosa National Park.
- 8. Conservation biologists in other areas of the world think that knowing more about what wildlife eat will help them make better decisions to protect threatened and endangered species. Explain two ways conservationists could use DNA metabarcoding data to help make these decisions.

Niche Partitioning and Species Coexistence

	Plant Taxa	Buffalo	Cattle	Impala
1	Hirpicium diffusum	Yes	Yes	Yes
2	Gutenbergia (genus)	Yes	Yes	Yes
3	Emilia discifolia	Yes	Yes	Yes
4	Osteospermum vaillantii	No	Yes	Yes
5	Helichrysum glumaceum	No	Yes	Yes
6	Asteraceae (family)	No	No	Yes
7	Eragrostis sp.	Yes	Yes	No
8	Digitaria (genus)	No	Yes	Yes
9	Tragus berteronianus	No	Yes	Yes
10	Setaria sphacelata	Yes	No	No
11	Eragrostis papposa	No	Yes	No
12	Urochloa brachyura	Yes	No	Yes
13	Echinochloa pyramidalis	Yes	No	No
14	Harpachne schimperi	Yes	Yes	Yes
15	Panicum maximum	Yes	Yes	Yes
16	Garnotia (genus)	Yes	No	No
17	Brachiaria eruciformis	Yes	No	No
18	Sporobolus agrostoides	Yes	No	No
19	Dinebra retroflexa	No	Yes	No
20	Pennisetum hohenackeri	Yes	No	No

The table to the left is from another metabarcoding study by Dr. Pringle. Use the table to complete a Venn diagram illustrating the different plants eaten by three different animals. Label a circle for each of the animals and then **place a dot** in the appropriate area of the graph for each plant taxa.



Data from Kartzinel, et al. (2015). PNAS 112(26), 8019-8024.

- 9. Which two animals have the most overlap in their diets? Justify your response.
- 10. Cattle and buffalo share a similar fundamental niche, the entire set of conditions under which a population can survive and reproduce. A realized niche is the set of conditions <u>actually used</u> by a given population. Explain what the data in the Venn diagram suggest about the realized niches of the cattle and buffalo and their ability to coexist. Use evidence to support your explanation.
- 11. If plant species #10, 13, 16, 17, 18, and 20 were no longer available to the buffalo, predict three consequences to the stability of the biological communities and ecosystem.