

INTRODUCTION

Vultures play a vital ecological role in the environment. They are the clean-up crew of the animal kingdom. They clean the landscape of dead animals that would otherwise spread disease. They are the most effective scavengers and can strip a whole carcass the size of a zebra in less than 30 minutes. Without vultures, carcasses would linger longer resulting in insect, rat and feral dog populations booming and the spread of diseases. By eating wildebeest placenta, vultures also prevent cattle from contracting malignant catarrh, an often fatal herpes virus. And by reducing carcasses to bones within hours, they suppress insect populations, linked with eye diseases in both people and livestock.

They are specifically adapted to eat rotten meat. They have very strong stomachs with a very low pH that can kill most disease, bacteria, viruses and pathogens. They are able to fly far and long and have very good eyesight which enables them to spot dead, or dying animals from far away. They will arrive at a carcass within minutes after its death and quickly consume it before any disease can spread. Their sharp, strong bills can tear flesh while their bald head and long neck can penetrate deep within a carcass without getting overly contaminated in bacteria.

They are magnificent birds that are perfectly adapted and sorely needed for a healthy ecosystem.

AIM AND PURPOSE OF LESSON

The aim of this lesson plan is to introduce students to the invaluable role vultures play in a healthy ecosystem. Furthermore, they will learn how vultures are specifically adapted to serve its purpose.

DURATION OF LESSON

60 – 80 minutes, depending on whether the optional activities are included.

TARGET AGE OF LESSON PLAN

Ages 9 to 12 or Grade 3 to 6

MATERIALS NEEDED

The teacher will need:

1. Lesson Plan 2 – Ecological Role of Vultures
2. A computer with internet connection to view the suggested videos. It is recommended to download the video before-hand.

3. Video 1: Vultures of East Africa: The Soap of the Savannah (3:51 min). To save time watch from minute 2:33. <https://youtu.be/yyvnhU0o6cE>
4. Video 2: Acid, Poop, and Barf: Vultures' Secret Weapons (3:47 min). <https://youtu.be/ieBhJlCxnt8>
5. Video 3: Vultures Have to Eat Animals Butt-First - Today I Learned (1:08 min) <https://youtu.be/4lxNxoOv4Zk>
6. Video 4: Egyptian vultures (2:05 min). <https://youtu.be/lwEhutnjzeU>
7. Video 5: Wild African vulture birds scavenge bones of dead animals - BBC wildlife (3:52 min). <https://youtu.be/zxj9YO4QtX0>
8. Answer Sheet 1 - 5 in Appendix A
9. OPTIONAL – projector and sound system to watch the video.

The Students will need:

1. Questionnaires 1 – 5 in Appendix B
2. Pen and paper
3. OPTIONAL: Vulture Adaptations Play-Act cards (downloadable from the BirdLife South Africa website <http://www.birdlife.org.za/documents/bird-of-the-year>)

OBJECTIVES AND OUTPUTS:

The students will:

- Discuss what they know of vultures with the teachers and the rest of the class.
- Watch the five short videos about vultures' various adaptations.
- Discuss in groups what they've learned from the videos.
- OPTIONAL: complete questionnaires.
- Report back to the teacher in their assigned groups.
- Have a class discussion about what the ecosystem will be like without vultures.
- Have a better understanding of the importance of vultures to the ecosystem and how they are adapted to fulfil that role.

VOCABULARY

Adaptation: a body part or feature or a behaviour that helps a living thing survive and function better in its environment.

Bacteria: a single cell organism, some of which cause disease.

Carcass: the body of a dead animal.

Carrion: the decaying flesh of dead animals.

Contaminated: to make something dirty, polluted or impure.

Ecosystem: a biological community of interacting organisms and their physical environment.

Environment: the natural world, as a whole or in a particular area.

Habitat: the natural home or environment of an animal, plant, or other organism.

Livestock: farm animals that have value.

Pathogens: a bacterium, virus, or other microorganism that can cause disease.

pH: a measure of acidity and alkalinity of a substance (in this case stomach acid). A pH value of 0 being most acidic, 7 being neutral and 14 being most alkaline.

Scavenger: an animal that feeds on dead plant material, trash, or dead animals (carrion).

Threat: a thing likely to cause damage or danger.

PROCEDURE

- [Duration 5 min] Begin the lesson with an entry task where students think and discuss what they know about vultures. Ask the following questions to the whole class and give them a few opportunities to raise their hands and answer the questions.
 - Do they like vultures?
 - Why do they like/not like vultures?
 - Why do they think vultures are important?
- [Duration 4 min] Set up the projector / TV / Computer and watch the first video: Vultures of East Africa: The Soap of the Savannah (3:51 min). To save time watch from minute 2:33. Ask them to focus on the following questions:
 - How much do they think vultures eat? Is it more or less than hyenas and feral dogs?
 - Why are vultures so effective in cleaning the ecosystem?
 - Why are vultures important. What do they do that other scavengers and insects can't?
- [Duration 5 min] Divide the students into three to five small discussion groups and allow them 5 minutes to discuss what they have learned and remembered from the video. Let them write down what they remembered and discussed.
- [Duration 4:30 min] Watch the second video: Acid, Poop, and Barf: Vultures' Secret Weapons (3:47 min). Ask them to focus on the following questions:
 - Vultures are adapted to eat rotten meat, how are they adapted to do this?
 - What other adaptations do they have?
 - What is the funniest adaptation vultures have?
 - Try to remember the details of what you are seeing, reading and hearing.
- [Duration 5 min] Divide the students into the same small discussion groups and allow them 5 minutes to discuss what they have learned and remembered from the video. Let them write down what they remembered and discussed.
- [Duration 2 min] Watch the third video: Vultures Have to Eat Animals Butt-First - Today I Learned (1:08). Ask them to focus on the following questions:
 - Why do vultures have to eat the softer parts of the animal?
 - Try to remember the details of what you are seeing, reading and hearing.
- [Duration 3 min] Watch the fourth video: Egyptian Vultures (2:05 min). Ask them to focus on the following questions:
 - What makes Egyptian Vultures different from other vultures?
 - Try to remember the details of what you are seeing, reading and hearing.
- [Duration 5 min] Watch the fifth video: Wild African vulture birds scavenge bones of dead animals - BBC wildlife (3:52 min). Ask them to focus on the following questions:
 - What do Bearded Vultures prefer to eat?
 - What special technique has the Bearded Vulture developed?
 - Try to remember the details of what you are seeing, reading and hearing.
- [Duration 5 min] Divide the students into the same small discussion groups and allow them 5 minutes to discuss what they have learned and remembered from the last two videos (the Egyptian Vulture and Bearded Vulture). Let them write down what they remember and discussed.
- [Duration 15 min] Students will now have 5 minutes per group to report back in their groups to the class and the teacher. They can use the notes they made during group discussions to help them remember what they have learned. To make this less time

consuming, assign only one video to each group to report back on. Use Answer Sheet 1 - 5 to guide the discussion.

11. OPTIONAL: Use Answer Sheet 1 - 5 instead to ask the students specific questions based on the videos. Or hand out Questionnaires 1 - 5 and give them 10 minutes to answer the questions.
12. OPTIONAL ACTIVITY [Duration 30 sec/student or group]
13. Play the Vulture Adaptations Play-Act cards. Either allow each student to play-act the adaptation they selected from the card pile, or divide the students into pairs or small groups to do it together.
14. [Duration 5 min] Lastly, allow the students to go back to their seats and end the lesson with a few questions to the whole class to help them think about the future:
 - a. What would happen if there were no more vultures?
 - b. Rat, feral dogs, insect and bacteria populations will increase. Diseases will spread to livestock, humans and water systems. Carcasses will be left for days to rot by itself.
 - c. What vulture adaptation did they wish they had?

APPENDIX A

ANSWER SHEET 1: VULTURES OF EAST AFRICA: THE SOAP OF THE SAVANNA

- 1. How much carrion do vultures eat? Is it more or less than hyenas and feral dogs?**
 - a. Vultures eat more carrion than hyenas and feral dogs. At about 70% of the total carrion biomass. (correct)
 - b. Vultures eat less than Hyenas and feral dogs – at about 30% of the total carrion biomass. (Incorrect)
- 2. Why are vultures seen as the soap of the savanna?**

They find the carcasses early and eat them fast. They neutralize the disease before it can spread.

ANSWER SHEET 2: ACID, POOP, AND BARF: VULTURES' SECRET WEAPONS

- 1. What is the pH of vultures' digestive system?**
 - a. Between 0 -1 pH (correct)
 - b. Between 1- 2 pH
 - c. 0.8 pH
- 2. What can the hydrochloric acid in vultures' stomach dissolve? Choose the one incorrect answer.**
 - a. Bones
 - b. Certain Metals
 - c. Poison (incorrect)
 - d. Pathogens
- 3. Vultures digestive system can kill viruses, parasites and diseases. Name the four that was mentioned in the video.**

Vultures' digestive system can kill salmonella, cholera, anthrax, rabies, and botulism.
- 4. Do vultures also have special blood?**

Yes, their blood is full of bacteria fighting antibodies.
- 5. Vultures poop directly on their legs and on the soil. This helps with three things. Name them.**

It helps them to cool down. It sanitizes their legs that are full of bacteria from the rotting carcass. The waste keeps killing pathogens in the grass around the carcass which helps to prevent the spread of disease to other animals and to soil and water systems.
- 6. Why do vultures have bald heads?**

The bald head helps to keep it clean as feathers would have trapped bacteria. The sun bakes the bare skin clean clean.

7. **What unique and disgusting strategy does vultures that enable them to fly away quickly after a meal if a predator should threaten them?**

They are able to projectile vomit to get rid of their stomach contents quickly in order to lift off faster from predators after a heavy meal. The vomit is acidic and might burn the predator.

ANSWER SHEET 3: VULTURES HAVE TO EAT ANIMALS BUTT-FIRST

1. **What can hyenas and lions do to a carcass that vultures can't?**

They are able to tear the tough hide of large animals in order to get to the softer flesh inside. Vultures rely on larger scavengers to do this for them.

2. **Where will vultures first start eating if the hide of the carcass is too tough?**

The eyes and the butt. Their beaks are not strong enough to tear open the hide of animals.

3. **Why are vultures more frequently seen eating through the eyes and butt?**

Large predators are hunted and killed causing their numbers to plummet. They are no longer there to open up the carcass.

ANSWER SHEET 4: EGYPTIAN VULTURES

1. **How do Egyptian Vultures break open their favourite food item, ostrich eggs?**

They use a rock as a tool to break open the egg. Sometimes it takes a few tries.

2. **Egyptian Vultures, unlike other vultures, have feathers on their head because they rarely eat carrion. Name a few of the things they like to eat.**

They eat things like lizards, worms, insects, rats, rabbits, garbage, over-ripe fruit, and eggs.

ANSWER SHEET 5: Wild African vulture birds scavenge bones of dead animals

1. **What do Bearded Vultures prefer to eat?**

- Meat
- Bones and marrow (correct)
- Tendons
- Skin
- Organs

2. **What do the bearded vulture do with his favourite food item?**

They pick up the bones (sometimes it can be as heavy as the bird itself) and fly high up in the sky with it. The bird then aims for a flat rock and drops it from the sky. Sometimes

it takes a few tries before the bone cracks open and allows the vulture to access the precious marrow inside and eat the remainder of the smaller bone fragments.

3. How long does it take for a young bird to perfect this technique?

It can take up to 7 years for a young Bearded Vulture to perfect the technique. At first they drop it too low or they miss the rocks.

APPENDIX B

QUESTIONNAIRE 1: VULTURES OF EAST AFRICA: THE SOAP OF THE SAVANNA

3. How much carrion do vultures eat? Is it more or less than hyenas and feral dogs? Choose the correct answer. Choose the correct answer.
- Vultures eat more carrion than hyenas and feral dogs. At about 70% of the total carrion biomass.
 - Vultures eat less than Hyenas and feral dogs – at about 30% of the total carrion biomass.
4. Why are vultures seen as the soap of the savanna?

ANSWER SHEET 2: Acid, Poop, and Barf: Vultures' Secret Weapons

8. What is the pH of vultures' digestive system? Choose the correct answer
- Between 0 -1 pH
 - Between 1- 2 pH
 - 0.8 pH
9. What can the hydrochloric acid in vultures' stomach dissolve? Choose the one **INCORRECT** answer.
- Bones
 - Certain Metals
 - Poison
 - Pathogens
10. Vultures digestive system can kill viruses, parasites and diseases. Name the four that was mentioned in the video.
11. Do vultures also have special blood?
12. Vultures poop directly on their legs and on the soil. This helps with three things. Name them.
13. Why do vultures have bald heads?
14. What unique and disgusting strategy does vultures have that enable them to fly away quickly after a meal if a predator should threaten it?

ANSWER SHEET 3: Vultures Have to Eat Animals Butt-First

4. What can hyenas and lions do to a carcass that vultures can't?
5. Where will vultures first start eating if the hide of the carcass is too tough?
6. Why are vultures more frequently seen eating through the eyes and butt?

ANSWER SHEET 4: Egyptian Vultures

3. How do Egyptian Vultures break open their favourite food item, ostrich eggs?
4. Egyptian Vultures, unlike other vultures, have feathers on their head because they rarely eat carrion. Name a few of the things they like to eat.

ANSWER SHEET 5: Wild African vultures scavenge bones of dead animals

4. What do bearded vultures prefer to eat? Choose the correct answer.
 - a. Meat
 - b. Bones and marrow
 - c. Tendons
 - d. Skin
 - e. Organs
5. What do the Bearded Vulture do with his favourite food item?
6. How long does it take for a young bird to perfect this technique?