

Name _____ Date _____

Vegetation Zones of Virunga National Park Answer Key

Virunga National Park is located along the eastern edge of the Democratic Republic of Congo in the center of Africa. The park borders Rwanda and Uganda and is the oldest national park in Africa. Virunga National Park, a UNESCO World Heritage Site, is only 7,800 square kilometers (3,000 square miles).

Virunga National Park is home to an incredible diversity of habitats that are distributed in a mosaic across the park. The habitats range from savannas and marshland to lava plains and permanent glaciers. Each habitat represents a particular vegetation zone, meaning it contains distinct collections of plants. Abiotic factors, the nonliving components of ecosystems (for example, soil type or the amount and seasonality of rainfall), vary across the park and help to define these zones. In this activity you will focus on three particular abiotic factors: elevation, precipitation, and temperature.

You will use MapMaker Interactive, a mapping tool, to investigate how these abiotic factors influence the distribution of vegetation zones in Virunga National Park. Begin by opening the following link: natgeo.org/mapmaker-abiotic-factors-virunga. This will load the Abiotic Factors in Virunga National Park maps in MapMaker Interactive. At the bottom, select the bookmark titled Virunga National Park. Use this map to complete this worksheet.

Part 1: Abiotic Factors and Vegetation Zones

1. Fill in the chart below and answer the following questions using the map, Virunga National Park. Select the marker at each location to learn more about the area.

Location	Elevation (m)	Precipitation (mm)	Temperature (°C)	Additional Observations
1	~4,400 meters (~14,435 feet)	Variable	-5°C–20°C (23°F–68°F)	
2	~920 meters (~3,018 feet)	900 millimeters (35 inches)	18°C–31°C (64°F–88°F)	
3	~2,500 meters (~8,200 feet)	2,000 millimeters (79 inches)	3.9°C–14.5°C (39°F–58.1°F)	

Table 1. Abiotic factors at locations 1, 2, and 3 within Virunga National Park.

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2. Use the scale bar to estimate the shortest and longest distances between the three locations.

Shortest Distance: Between Location 2 and Location 3, approximately 90 kilometers (56 miles)

Longest Distance: Between Location 1 and Location 3, approximately 250 kilometers (155 miles)

3. Compare and contrast the elevation at each location.

The elevation at location 2 is lower than Locations 1 and 3. Location 1 is almost 2,000 meters (6,562 feet) higher than location 3.

4. Compare and contrast the precipitation at each location.

The precipitation at Location 1 is not provided, but the precipitation at Location 2 is nearly 1,000 millimeters (39 inches) less than the precipitation at Location 3.

5. Compare and contrast the temperature at each location.

The temperature at Location 2 is higher than Locations 1 and 3. Locations 1 and 3 have a similar temperature range, but Location 1 drops all the way to freezing, presumably at night.

6. Identify the vegetation zone of each location by comparing the data you collected with the general characteristics of the vegetation zones listed below.

Vegetation zone of location 1: alpine

Vegetation zone of location 2: savanna

Vegetation zone of location 3: montane forest

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Vegetation Zones	General Characteristics
alpine	Grasses, mosses and lichens, no tree growth; Elevation: above 3,800 meters (12,467 feet); Snow permanently present at the highest elevations; Not many large vertebrates, but many endemic amphibians and small mammals; Less than 250 millimeters (10 inches) of precipitation annually; Average temperatures oscillate between -5°C–20°C (23–68°F), with freezing occurring 80–90% of nights
montane forest	Dense vegetation that includes bamboo, evergreen shrubs, and wild celery; Home to owl-faced monkeys, duikers, and many species of small mammals; Elevation ranges from 2,000–3,000 meters (6,562–9,843 feet); Average annual rainfall: 1,200–2,800 millimeters/year (47–110 inches/year); Average temperature is 13–15°C (55–59°F)
lowland forest	At least 30% tree cover (generally less than 15 meters (49 feet) tall), shrubs; Average annual rainfall: approximately 2,000 millimeters (79 inches); Seasonal temperature variation of 18°C–30°C (64.4°F–86°F); Elevation averages ~400 meters (1,312 feet), but some hills can rise 700–800 meters (2,297–2,625 feet); Native mammals include forest elephants, bonobos, and okapi
savanna	Home to elephant, buffalo, and warthogs; Dominated by grassland, some scattered trees; Porous soil; Warm to hot climate; Temperature range: 20°C–30°C (68°F–86°F); Average annual rainfall: 500–1,300 millimeters/year (20–51 inches/year); Seasons: dry & rainy; Occurs at various altitudes
lava plains	Little vegetation; Hardened lava from active volcanoes; Occurs at various altitudes and temperature ranges; Precipitation levels are variable

Table 2. General Characteristics of Vegetation Zones

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Part 2: Influences of Abiotic Factors

1. Explain how abiotic factors influence the distribution of the three vegetation zones you identified in Part 1. Use your existing knowledge of ecological processes and evidence to support your claim.

Example answer:

• The low annual average precipitation in the savanna inhibits the dense growth of trees, but warmer temperatures allow for year-round plant growth, which can sustain larger animals (e.g., elephants and buffalo).

• The high annual average precipitation of montane forest promotes tree growth since precipitation is not a limiting factor.

• The high elevation of the alpine vegetation zone inhibits significant plant growth because of the lack of moisture, extreme weather conditions such as high wind and extreme cold, and poor soil quality.

2. Draw a general conclusion about the role of abiotic factors in the distribution of plant life. Provide examples to support your conclusion.

Abiotic factors can influence the distribution of plant life by promoting or limiting the ability of certain plant species to live in the area depending on their evolutionary adaptations. Possible examples: Temperature can limit photosynthesis; water availability can limit transpiration and photosynthesis; nutrient availability/soil fertility can limit or enhance growth; stresses such as wind abrasion, heavy snow and frost can limit growth.

3. Hypothesize how abiotic factors might influence the distribution of animal species. Provide reasoning to support your claim.

Abiotic factors determine the type of vegetation that will grow in an area. If the animal's dietary needs cannot be met with this vegetation, then the animal will seek out alternative areas. This directly affects the distribution of herbivores and omnivores. It indirectly affects carnivores, whose distribution depends on the distribution of their prey.