

# Pressure on Earth

Use evidence to connect human demand with Earth system changes.

**MS-ESS3-4** "Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems..."

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## 1 READ AND MARK \_\_\_\_\_ Read it twice

**YOUR JOB** Underline two facts or data points that could support an argument about human resource use. Circle each Earth system named as changing, then number two cause-and-effect chains in the passage.

### People, Resources, and Systems

- ① Earth's systems are connected. As the number of people grows, people need more food, homes, water, and energy. But population size is only one part of resource use. Per-capita consumption means the average amount used by one person. A community of five million people can place greater demand on resources if each person uses more electricity, meat, fuel, or fresh water. Looking at both population and per-person use helps scientists explain pressures on Earth's systems.
- ② Freshwater shows one connection. Agriculture uses about 70 percent of the freshwater withdrawn worldwide, mainly to grow crops and raise animals. As populations grow and diets use more water-intensive foods, farms may pump more groundwater or divert more water from rivers. Lower groundwater levels can change the hydrosphere, while reduced river flow can shrink wetlands and affect fish, birds, and other living things in the biosphere. These changes can also leave salts concentrated in soil, altering part of the geosphere.
- ③ Energy and mineral use create another set of changes. In 2023, fossil fuels supplied about 80 percent of the world's energy. When coal, oil, and natural gas are burned, carbon dioxide enters the atmosphere. Higher carbon dioxide levels trap more heat, which can change climate patterns and speed the melting of land ice. Mining metals and minerals can remove rock and soil, changing landforms and habitats. This evidence supports an argument that rising population and higher per-person resource use can change Earth's systems faster. Science describes these effects, while communities decide which actions to take.

**2 ANSWER WITH EVIDENCE** \_\_\_\_\_ Use the passage

**1** What does per-capita consumption mean? Explain why population size alone does not show all resource demand.

**2** Write a claim that links increasing population and per-person consumption to freshwater change. Support the claim with two details from paragraph 2.

**3** Follow the freshwater cause-and-effect chain. How can greater farm water use change the hydrosphere and then the biosphere or geosphere?

**4** Use one piece of evidence from paragraph 3 to explain how greater energy use can change Earth's systems.

**3 YOUR TURN** \_\_\_\_\_ Your own words

Choose freshwater or energy and minerals. Write a four- or five-sentence argument that states a claim, uses two facts from the passage as evidence, explains changes to at least two Earth systems, and distinguishes what science can describe from what communities must decide.

---

---

---

**PART 1 • READ AND MARK**

Underline two facts or data points that could support an argument about human resource use. Circle each Earth system named as changing, then number two cause-and-effect chains in the passage. Accept any marking that follows this job and points at the right text.

**PART 2 • ANSWERS**

| # | QUESTION                                                                                                                                             | ANSWER                                                                                                                                                                                                                                                                                |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | What does per-capita consumption mean? Explain why population size alone does not show all resource demand.                                          | <b>Per-capita consumption is the average amount of a resource used by one person. A community with high per-person use can place greater demand on resources than a community with lower per-person use.</b>                                                                          |
| 2 | Write a claim that links increasing population and per-person consumption to freshwater change. Support the claim with two details from paragraph 2. | <b>Increasing population and per-person consumption can reduce available freshwater. Agriculture uses about 70 percent of freshwater withdrawals, and growing populations or more water-intensive diets can lead farms to pump more groundwater or divert more river water.</b>       |
| 3 | Follow the freshwater cause-and-effect chain. How can greater farm water use change the hydrosphere and then the biosphere or geosphere?             | <b>Pumping more groundwater can lower groundwater levels, and diverting river water can reduce river flow in the hydrosphere. Lower water levels or flow can shrink wetlands and affect living things in the biosphere, while concentrated salts can alter soil in the geosphere.</b> |
| 4 | Use one piece of evidence from paragraph 3 to explain how greater energy use can change Earth's systems.                                             | <b>Fossil fuels supplied about 80 percent of the world's energy in 2023. Burning more coal, oil, and natural gas adds carbon dioxide to the atmosphere, which traps heat and can change climate patterns and speed land-ice melting.</b>                                              |

**PART 3 • YOUR TURN (SAMPLE ANSWER)**

An increase in population and per-person consumption can put more pressure on freshwater systems. Agriculture uses about 70 percent of freshwater withdrawn worldwide, and water-intensive diets can lead farms to pump more groundwater or divert rivers. Lower groundwater and river flow change the hydrosphere, while shrinking wetlands harms organisms in the biosphere and concentrated salts alter soil in the geosphere. Science can describe these likely changes, but the community must decide how to respond.

Accept equivalent claims that correctly connect population growth and higher per-person use to resource demand and Earth system changes. For the open task, require a claim, two accurate passage-based facts, clear cause-and-effect reasoning for at least two systems, and the distinction between scientific evidence and community decisions.