

Ecosystems: matter moves

Grade 5 | Science | 5E | 55 minutes | Teacher guide

Learning target and preparation

Students construct and revise a food-web model, trace matter among organisms and the environment, and justify a possible effect of removing an organism. Success: evidence-based feeding links, a route through decomposition and a distinction between matter and energy.

Prerequisites: living/nonliving, plant/animal and reading short factual cards. Print student pages 1–3 and 5 per pair; pages 4, 6 and 7 per student. Precut cards. Provide pencils, scrap paper and one large sheet per pair. Optional illustrated observation plates are on pages 8–9; project them rather than printing for every student. No animal handling or food is required.

55-minute sequence

Engage | 5 min. Project the optional woodland illustration (student page 8), or write "grass – deer – wolf" on the board. Ask how the three could be connected and where an organism's material goes after it dies. Record tentative ideas; the wolf is a prompt, not a card in the model.

Explore | 18 min. Pairs use forest cards to build a web (10 min), then record and justify links (8 min). Ask "Which card supports that arrow?" and "Where could this matter go next?" Note reversed arrows and missing decomposers.

Explain | 12 min. Compare two models (4 min). Name producers, consumers and decomposers (3 min). Add environment labels and revise matter pathways (5 min). Plant food is made using matter from air and water with energy from light; soil minerals also enter plants. Do not teach sunlight as matter or soil as the source of all plant food.

Elaborate | 12 min. Briefly observe the optional reef plate (page 9), then build the reef model (5 min total), write a two-step prediction (5 min), discuss the urchin alternative (2 min). This change of ecosystem tests transfer.

Evaluate | 8 min. Individual exit ticket (6 min), collect and select one next-step task (2 min). Assess the recorded model as well as the exit ticket.

The source guide uses 45 minutes. This 55-minute pilot adds explicit matter modeling and a longer exit ticket. For a 45-minute slot, carry the 12-minute reef transfer into the next lesson; do not rush it into a token phase.

Answers and scoring

Grade 5 | Teacher copy

Forest model: acceptable links

Food to eater: grass to rabbit/deer/mouse; oak to deer/mouse/leaf beetle; rabbit to fox/hawk; mouse to snake/owl/hawk/fox; snake to hawk; earthworm to fox. Three-level example: grass to mouse to owl. The beetle and deer need not have a predator shown in this small model.

Matter route: air and water to oak; oak to mouse; dead mouse and waste to dead material; decomposer microbes break down remains and release materials into the environment; plants use environmental matter again. The supplied wood-decay fungus acts on dead oak wood, not all animal remains. Use the bacteria card from the environment sheet to complete an animal-remains pathway. A complete card-only route can instead use dead oak wood to fungus to environment, alongside oak to mouse.

Earthworms consume detritus and fragment litter. Fungi and bacteria chemically decompose it. Do not require students to classify an earthworm as a fungus-like decomposer. Sunlight provides energy, while matter circulates. Decomposers also release gases; recycling is not confined to soil.

Reef task

Feeding: surface algae to parrotfish; surface algae to urchin; zooplankton to coral. Dead material to decomposer microbes to dissolved materials in water is a simplified recycling pathway. Fewer parrotfish may allow more algae and less space for corals. Urchin grazing could partly compensate. Coral is an animal; surface algae competing with it are not the symbiotic algae living inside its tissues.

Exit answers | 6 points

Q1, 2 points: deer and mice each lose an oak food source (1 point each with correct link). Owls may be affected indirectly later. The dead oak can initially provide more material for the wood-decay fungus; do not mark every organism as immediately starving.

Q2, 3 points: environment to plant (1); plant to animal (1); dead wood through fungus back to environment, with decomposition explained (1). Accept equivalent scientifically coherent routes. No molecular explanation is needed.

Q3, 1 point: sunlight supplies energy; matter is recycled, energy is transferred and ultimately dissipated as heat. Accept age-appropriate wording such as "matter can be reused; sunlight keeps supplying energy."

Ready to extend: 5–6/6 AND the model has at least four labeled matter transfers and a three-level feeding pathway. Developing: 3–4, revisit the missing link. 0–2: rebuild one pathway with teacher support. These are local teaching criteria, not standardized attainment cutoffs.

Adaptations and reference check

Grade 5 | Teacher copy

Support, extension and follow-through

Access: read cards aloud; offer precut cards; start with grass, mouse, owl and fungus; add environment labels next. Give the frame "Matter moves from ___ to ___ when ___." Allow a recorded oral explanation or a scribe using the same science criteria. Enlarge to A3/ledger if needed.

Language: preview everyday meanings of matter, remains and waste; then name producer, consumer and decomposer after exploration. Let students rehearse explanations in a familiar language. Card diet clues reduce reliance on local wildlife knowledge.

Extension: add a plausible organism with a cited diet and explain one limitation of the model. Separate a prediction from certainty and ask what field observations would test it. Do not treat a simplified composite woodland as a documented local ecosystem.

Next lesson: reversed arrows → physically pass a paper "matter token" from food to consumer; missing environment → rebuild a plant/decomposer loop; confident models → compare two alternative predictions about urchin grazing.

Alignment and scope

NGSS 5-LS2-1 targets models of matter moving among plants, animals, decomposers and the environment. The added environment/recycling work addresses that focus. A food web showing energy alone would be incomplete evidence. This is one instructional opportunity, not certification of full standard mastery. Verify local curriculum adoption.

BSCS supports the five-phase inquiry sequence. The 55-minute timing is an authored classroom design, not a prescribed duration. NOAA supports the role of grazing fish in controlling reef algae and maintaining space for corals. Cards are original simplified teaching text, not a copied species inventory.

References checked September 23, 2026

NGSS: <https://www.nextgenscience.org/pe/5-ls2-1-ecosystems-interactions-energy-and-dynamics>

BSCS: <https://bscs.org/reports/the-bscs-5e-instructional-model-origins-and-effectiveness/>

REEF: <https://www.fisheries.noaa.gov/feature-story/restoring-natural-grazing-processes-can-help-coral-reefs>