



Georgia Performance Standards for Urban Watch Restoration Field Trips

6th grade

S6E3. Students will recognize the significant role of water in earth processes.

- a. Explain that a large portion of the Earth's surface is water, consisting of oceans, rivers, lakes, underground water, and ice.
- b. Relate various atmospheric conditions to stages of the water cycle.

S6E5. Students will investigate the scientific view of how the earth's surface is formed.

- b. Investigate the contribution of minerals to rock composition.
- d. Describe processes that change rocks and the surface of the earth.
- h. Describe soil as consisting of weathered rocks and decomposed organic material.
- i. Explain the effects of human activity on the erosion of the earth's surface.
- j. Describe methods for conserving natural resources such as water, soil, and air.

7th grade

S7L3. Students will recognize how biological traits are passed on to successive generations.

- b. Compare and contrast that organisms reproduce asexually and sexually (bacteria, protists, fungi, plants & animals).

S7L4. Students will examine the dependence of organisms on one another and their environments.

- a. Demonstrate in a food web that matter is transferred from one organism to another and can recycle between organisms and their environments.
- b. Explain in a food web that sunlight is the source of energy and that this energy moves from organism to organism.
- c. Recognize that changes in environmental conditions can affect the survival of both individuals and entire species.
- d. Categorize relationships between organisms that are competitive or mutually beneficial.
- e. Describe the characteristics of Earth's major terrestrial biomes (temperate forest).

S7L5. Students will examine the evolution of living organisms through inherited characteristics that promote survival of organisms and the survival of successive generations of their offspring.

- a. Explain that physical characteristics of organisms have changed over successive generations (e.g. Darwin's finches and peppered moths of Manchester).
- b. Describe ways in which species on earth have evolved due to natural selection.

8th grade

SS8G1 The student will describe Georgia with regard to physical features and location.

- b. Describe the five geographic regions of Georgia; include the Blue Ridge Mountains, Valley and Ridge, Appalachian Plateau, Piedmont, and Coastal Plain.

High School Science Courses

Biology

SB3. Students will derive the relationship between single-celled and multi-celled organisms and the increasing complexity of systems.

- a. Explain the cycling of energy through the processes of photosynthesis and respiration.
- b. Compare how structures and function vary between the six kingdoms (archaebacteria, eubacteria, protists, fungi, plants and animals).

SB4. Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

- a. Investigate the relationships among organisms, populations, communities, ecosystems, and biomes.
- b. Explain the flow of matter and energy through ecosystems by arranging components of a food chain according to energy flow.
- c. Relate environmental conditions to successional changes in ecosystems.

- d. Assess and explain human activities that influence and modify the environment such as global warming, population growth, pesticide use, and water and power consumption.
- e. Relate plant adaptations, including tropisms, to the ability to survive stressful environmental conditions.
- f. Relate animal adaptations, including behaviors, to the ability to survive stressful environmental conditions.

SB5. Students will evaluate the role of natural selection in the development of the theory of evolution.

- d. Relate natural selection to changes in organisms.

Botany

SBO2. Students will be able to identify and describe Georgia's major physiographic provinces and their natural plant communities.

- a. Identify and describe four major regions (mountain, piedmont, coastal plain, salt marsh), the aquatic systems [freshwater, estuaries, and marine] systems, and their natural plant (oak-hickory-pine, oak-pine, long leaf pine-wire grass, cord grass, algal) communities of Georgia.
- b. Use taxonomic keys to identify local flora and recognize major representative groups of the southeast.
- c. Explore the effects of nonnative invasive plants on natural communities.
- d. Investigate the factors that cause plants to become endangered and the effect that extinction has on natural communities.

SBO3. Students will explore the structures and processes necessary for the mutual survival of plants and animals.

- a. Describe and relate plant structures (organs, tissues, cells, organelles) to plant processes (photosynthesis, respiration, transport, growth, reproduction, dispersal).
- c. Explore how fruit and seed adaptations help promote dispersal, which prevents competition between plants and helps in colonization.

SBO5. Students will analyze the diversity of plant adaptations and responses to environmental extremes.

- a. Describe the diversity of plants and their adaptations in relation to differing ecosystems and changing environments, both long term (climate) and short term (seasonal and diurnal).
- d. Analyze how human activities impact plants and the sustainability of plant communities.

SBO6. Students will analyze the economic and ecological importance of plants in society.

- a. Explain the uses and values of plants in different societies (agriculture, horticulture, industry, medicine, biotechnology).

b. Explain how plants impact the environment providing diverse habitats for birds, insects, and other wildlife in ecosystems.

Ecology

SEC1. Students will analyze how biotic and abiotic factors interact to affect the distribution of species and the diversity of life on Earth.

a. Characterize the biotic and abiotic components that define various biomes and aquatic life zones.

c. Investigate factors that lead to the species richness of an ecosystem and describe the importance of biodiversity.

d. Relate the role of natural selection to organismal adaptations that are specific to their habitats and describe some examples of coevolution.

SEC2. Students will investigate factors influencing population density, dispersion, and demographics.

a. Evaluate factors that regulate population growth to include intraspecific competition in population growth and population density.

d. Relate the rapid growth of human population to environmental problems.

SEC3. Students will explore and analyze community interactions.

a. Compare and contrast species interactions (e.g. predation, parasitism, mutualism, commensalism, and competition) and adaptations that have evolved in response to interspecific selective pressures.

b. Explore ecological niches and resource partitioning.

c. Identify dominant, keystone, foundation, and endangered species and their roles in ecosystems and communities, locally and globally.

d. Analyze species diversity as it relates to the stability of ecosystems and communities.

e. Evaluate ecological succession in terms of changes in communities over time and the impact of disturbance on community composition.

SEC5. Students will assess the impact of human activities on the natural world, and research how ecological theory can address current issues facing our society, locally and globally.

d. Explain the consequences of habitat fragmentation and habitat loss on biodiversity in relation to island biogeography, and apply island biogeography theory to the design of parks and nature preserves.

Entomology

SEN1. Students will identify and analyze the roles of insects in ecosystems.

a. Illustrate the important function(s) of insects in diverse terrestrial and freshwater food webs (i.e., as herbivores, predators, and scavengers).

- b. Explain the role of insects in various niches.
- c. Compare species diversity and biomass in different terrestrial habitats and evaluate why insects are the dominant organisms worldwide by either measure.
- d. Analyze the numerous ways that insects affect ecosystems (e.g., plant pollination, decomposers/recyclers of organic matter).
- f. Explain how some groups of insects are used as water quality indicators because they are sensitive to habitat change.

SEN2. Students will investigate the reasons for insect success.

- a. Investigate the insect body plan and compare and contrast to other arthropods (e.g., Arachnida, Crustacea).

Environmental Science

SEV2. Students will demonstrate an understanding that the Earth is one interconnected system.

- b. Recognize and give examples of the hierarchy of the biological entities of the biosphere (organisms, populations, communities, ecosystems, and biosphere).
- c. Characterize the components that define a Biome.
 - Abiotic Factors – to include precipitation, temperature and soils.
 - Biotic Factors – plant and animal adaptations that create success in that biome.

SEV3. Students will describe stability and change in ecosystems.

- b. Explain succession in terms of changes in communities through time to include changes in biomass, diversity, and complexity.
- c. Explain how succession may be altered by traumatic events.
- d. Explain how biotic and abiotic factors influence populations.
- e. Describe interactions between individuals (*i.e.* mutualism, commensalisms, parasitism, predation, and competition).

SEV5. Students will recognize that human beings are part of the global ecosystem and will evaluate the effects of human activities and technology on ecosystems.

- c. Explain how human activities affect global and local sustainability.
- d. Describe the actual and potential effects of habitat destruction, erosion, and depletion of soil fertility associated with human activities.

Zoology

SZ2. Students will explain the evolutionary history of animals over the geological history of Earth.

- b. Explain the concepts evolution, adaptation, natural selection, convergence, and speciation.

SZ4. Students will assess how animals interact with their environment including key adaptations found within animal taxa.

- a. Discuss morphological and physiological adaptations relative to ecological roles.
- b. Relate animal adaptations, including behaviors, to the ecological roles of animals.
- c. Explain various life cycles found among animals (e.g., arthropod metamorphosis; egg, tadpole, adult stages in the amphibian life cycle).

SZ5. Students will evaluate the relationships between humans and other animals.

- a. Describe the effects of human activities such as habitat destruction, over hunting, introduced species, and pollution on animal biodiversity.
- b. Explain the importance of species diversity to the biological resources needed by human populations including food, medicine, and natural aesthetics
- c. Compare and contrast how humans can preserve animal diversity in captive and natural environments with regard to habitat creation and conservation, research, legislation, animal enrichment, diet, medical, breeding programs and management of genetic diversity at local and global levels.