ENVIRONMENTAL RESOURCES: SOIL AND WATER

Curriculum Content Framework

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Curriculum Content Framework

ENVIRONMENTAL RESOURCES: SOIL AND WATER

Grade Levels: 10, 11, 12 **Prerequisites: None**
Course Code: 491230

Course Description: This course focuses on environmental concerns related to soil, air, and water. Emphasis is placed on soil and water in relation to agricultural processes. Students also will investigate ways to prevent contamination and conserve soil and water.

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Unit 1: Environmental Concerns

8 Hours

Terminology: Career Development Event (CDE), conservation, ecosystem, environment, food chain, habitat, natural resource, nonrenewable natural resource, preservation, Proficiency, renewable natural resource, Supervised Agriculture Experience (SAE)

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
1.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
1.2 Identify areas of environmental concern	1.2.1 Research each area of environmental concern (soil, water, wildlife, air, climate, wetlands, and waste management)	Foundation	Reading	Uses written resources (books, dictionaries, directories) to obtain factual information [1.3.23]
1.3 Discuss career opportunities relating to environmental science	1.3.1 Research a career in environmental resource management to determine educational requirements, working conditions, and salary	Foundation	Listening	Listens for conversation [1.2.4] Listens to follow directions [1.2.6]
			Writing	Uses language, style, organization, and format appropriate to subject matter, purpose, and audience [1.6.19]
		Personal Management	Career Awareness, Development, and Mobility	Develops skills to locate, evaluate, and interpret career information [3.3.4]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
1.4 Identify FFA activities that support an interest in soil and water management		Foundation	Reading	Draws conclusions from what is read [1.3.12] Identifies relevant details, facts, and specifications [1.3.16]
		Personal Management	Organizational Effectiveness	Identifies characteristics desired by organization [3.3.6]

Unit 2: Soils

5 Hours

Terminology: cover crop, crop rotation, land capability classes, organic matter, parent material, rill erosion, sheet erosion, silt fence, soil conservation, soil erosion, soil pH, soil profile, soil texture, soil triangle, strip cropping, terrace

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
2.2 Explain how soils are formed		Foundation	Speaking	Pronounces words correctly [1.5.9] Uses proper voice inflection [1.5.13]
2.3 List the solid components of soil		Foundation	Reading	Adjusts reading strategy to purpose and type of reading (skimming and scanning) [1.3.1]
			Writing	Organizes information into an appropriate format [1.6.10]
		Thinking	Knowing how to Learn	Develops personal learning strategies – note taking, clustering related items, flash cards, etc. [4.3.2]
2.4 Discuss how soil texture is determined	2.4.1 Determine the texture of several soil samples	Foundation	Science	Chooses appropriately from a variety of scientific methods and techniques to complete a task [1.4.9]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.5 Label the layers found in the soil horizon	2.5.1 Observe exposed soil to determine presence of layers	Foundation	Science	Reads measurements from common measuring devices [1.4.21] Records data related to the soil horizon [1.4.22]
			Writing	Evaluates written information for appropriateness/clarity/content [1.6.9]
		Personal Management	Responsibility	Sets high standards for self in completion of a task [3.4.9]
2.6 List the factors that contribute to soil erosion		Foundation	Listening	Listens for content [1.2.3] Listens for long-term context [1.2.7]
			Reading	Applies/Understands technical words that pertain to subject [1.3.6]
		Thinking	Creative Thinking	Combines ideas or information in a new way [4.1.2] Makes connections between seemingly unrelated ideas [4.1.6]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
2.7 Define the purpose and characteristics of land capability classes	2.7.1 Classify land areas around the school according to their capabilities	Foundation	Reading	Applies information and concepts derived from printed materials [1.3.3]
			Writing	Adapts notes to proper form [1.6.1]
		Thinking	Decision Making	Evaluates information/data to make best decision [4.2.5]
2.8 List major soil conservation practices		Foundation	Reading	Applies information and concepts derived from printed materials [1.3.3]
			Writing	Adapts notes to proper form [1.6.1]
		Thinking	Decision Making	Evaluates information/data to make best decision [4.2.5]

Unit 3: Water

8 Hours

Terminology: aquifer, hydrologic cycle, irrigation, surface water, watershed, water table

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
3.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
3.2 Explain the importance of surface water and its major sources	3.2.1 Map out the hydrologic cycle	Foundation	Reading	Uses graphs/charts/tables to obtain factual information [1.3.21]
		Personal Management	Responsibility	Comprehends ideas and concepts related to responsible water use [3.4.2]
3.3 Discuss ground water and the water table	3.3.1 Using a ground water model, trace the pathways of water to the water table	Foundation	Writing	Presents answers/conclusions in a clear and understandable form [1.6.13] Uses words appropriately [1.6.21]
		Thinking	Seeing Things in the Mind's Eye	Imagines flow of work activities from narrative descriptions [4.6.1] Uses senses to perceive the process of replenishing ground water [4.6.5]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
3.4 Describe the process for testing ground water quality	3.4.1 Test water samples from the community 3.4.2 Identify problem areas in the community, using water samples	Foundation	Reading Writing	Determines what information is needed [1.3.10] Follows written directions [1.3.13] Applies/Uses technical words and concepts [1.6.4] Checks, edits, and revises document for correct information, appropriate emphasis, form, grammar, spelling, and punctuation [1.6.5]
3.5 List methods of water conservation		Foundation	Reading Science Writing	Locates pertinent information in documents – such as manuals, graphs, and schedules – to perform tasks [1.3.18] Analyzes environmental issues (ecology, pollution, waste management) [1.4.2] Takes notes from various sources [1.6.18]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
3.6 Discuss the purposes and effects of dams on the environment	3.6.1 Research the various dam areas in the United States, and present your findings in a speech	Foundation	Science	Describes/Explains scientific principles related to water storage [1.4.14]
			Speaking	Responds to listener feedback [1.5.10]
				Speaks effectively, using appropriate eye contact, gestures, and posture [1.5.11]

Unit 4: Wildlife

9 Hours

Terminology: amphibian, aquatic, biennial, canopy, community, cover, ectothermic, edge, endothermic, home range, mammals, mast, perennial, population, predator, prey, reptile, shrub, terrestrial, tree, understory, vine, wildlife animal

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
4.2 List the components of habitat	4.2.1 Use a web diagram to show the relationship between all the components of a habitat	Foundation	Reading	Locates pertinent information in documents – such as manuals, graphs, and schedules – to perform tasks [1.3.18]
			Science	Analyzes environmental issues
			Writing	Takes notes from various sources [1.6.18]
4.3 Discuss the role climate plays on habitat types		Foundation	Listening	Listens for conversation [1.2.4]
			Speaking	Participates in conversation, discussion, and group presentations [1.5.8]
		Interpersonal	Cultural Diversity	Works effectively with men and women from diverse backgrounds – ethnic, social, educational, etc. [2.2.5]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
4.4 Discuss the role plant life plays in wildlife habitat		Foundation	Speaking	Speaks effectively, using appropriate eye contact, gestures, and posture [1.5.11]
		Personal Management	Responsibility	Exhibits enthusiasm in approaching and completing tasks [3.4.3]

Unit 5: Air

8 Hours

Terminology: acid rain, air pollutant, air pollution, air quality, air quality standard, emission, nonpoint source pollution, particulate, point source pollution

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
5.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
5.2 Explain the importance of air		Foundation	Speaking	Speaks effectively, using appropriate eye contact, gestures, and posture [1.5.11]
		Personal Management	Responsibility	Exhibits enthusiasm in approaching and completing tasks [3.4.3]
5.3 Describe the kinds and sources of air pollution	5.3.1 Identify the sources of air pollution in your community	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]
	5.3.2 Choose one source of air pollution in the community, and present a paper on solving the problem	Thinking	Creative Thinking	Develops visual aids to increase audience interest [4.1.4] Prepares presentation based on subject research, interviews, surveys [4.1.10]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
5.4 Discuss the implications that air pollution has on the environment		Foundation	Speaking	Participates in conversation, discussion, and group presentations [1.5.8]
		Interpersonal	Teamwork	Contributes to group with ideas, suggestions, and effort [2.6.2]

Unit 6: Wetlands

9 Hours

Terminology: biological wetland damage, bog, chemical wetland damage, estuary, freshwater wetland, marsh, physical wetland damage, saltwater marsh, saltwater wetland, swamp, wetland, wetland restoration, wet meadow

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
6.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
6.2 Discuss the types of wetlands	6.2.1 Invite a wetlands expert to address the class on the value of wetlands	Foundation	Science	Chooses appropriately from a variety of scientific methods and techniques to complete a task [1.4.9]
	6.2.2 Identify wetland areas in your community		Speaking	Pronounces words correctly [1.5.9]
		Interpersonal	Teamwork	Contributes to group with ideas, suggestions, and effort [2.6.2]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
6.3 Explain the importance of wetlands		Foundation	Writing	Presents answers/conclusions in a clear and understandable form [1.6.13] Uses words appropriately [1.6.21]
		Thinking	Seeing Things in the Mind's Eye	Imagines flow of work activities from narrative descriptions [4.6.1] Uses senses to perceive the process of replenishing ground water [4.6.5]
6.4 Discuss the destruction of wetlands	6.4.1 Outline a method of wetland destruction and its ramifications to the environment	Foundation	Science	Describes/Explains scientific principles related to water storage [1.4.14]
			Speaking	Responds to listener feedback [1.5.10] Speaks effectively, using appropriate eye contact, gestures, and posture [1.5.11]
6.5 Discuss wetland conservation	6.5.1 Visit the Soil Conservation Service to discuss the various wetland conservation programs available to landowners	Foundation	Speaking	Participates in conversation, discussion, and group presentations [1.5.8]
		Interpersonal	Teamwork	Contributes to group with ideas, suggestions, and effort [2.6.2] Works effectively with others to reach a common goal [2.6.6]

Unit 7: Waste Management

8 Hours

Terminology: biodegradable wastes, detoxification, domestic wastewater, effluent, eutrophication, hazardous waste, health hazard, landfill, radioactive waste, recycling, solid waste, spill, toxicity, wastewater

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
7.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
7.2 Explain the kinds and sources of wastewater	7.2.1 Tour a wastewater treatment facility	Foundation	Writing	Presents answers/conclusions in a clear and understandable form [1.6.13] Uses words appropriately [1.6.21]
		Thinking	Seeing Things in the Mind's Eye	Imagines flow of work activities from narrative descriptions [4.6.1] Uses senses to perceive the process of replenishing ground water [4.6.5]

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		ACADEMIC AND WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
7.3 Discuss the kinds and sources of solid waste		Foundation	Reading Science	Applies information and concepts derived from printed materials [1.3.3] Analyzes environmental issues (ecology, pollution, waste management) [1.4.2]
7.4 Discuss the kinds and sources of hazardous waste	7.4.1 Identify potential sources of hazardous waste in the community 7.4.2 Research the laws of your community and state regarding hazardous waste	Foundation	Listening Speaking	Listens for conversation [1.2.4] Participates in conversation, discussion, and group presentations [1.5.8]

Unit 8: Biological Processes

5 Hours

Terminology: *Animalia*, compost, consumer, decomposer, *Fungi*, microbiology, microscopic organisms, *Monera*, *Plantae*, producer, *Protista*

CAREER AND TECHNICAL SKILLS What the Student Should Be Able to Do		**ACADEMIC AND WORKPLACE SKILLS** What the Instruction Should Reinforce		
Knowledge	**Application**	**Skill Group**	**Skill**	**Description**
8.1 Define terms		Foundation	Reading	Applies/Understands technical words that pertain to subject [1.3.6]
8.2 Discuss the importance of the nutrient cycle	8.2.1 Diagram the nutrient cycle	Foundation	Listening Speaking	Listens for conversation [1.2.4] Participates in conversation, discussion, and group presentations [1.5.8]

Glossary

Unit 1: Environmental Concerns

1. Career Development Event (CDE) – competitive activities in the FFA that measure individuals and teams in the application of classroom-acquired knowledge; activities specifically designed to promote career skill acquisition in agriculture education

2. Conservation – the wise use of natural resources

3. Ecosystem – all the parts of a particular environment

4. Environment – all the factors that affect a living thing

5. Food chain – the ranking of species into successive levels in which each feeds on the one below

6. Habitat – the physical area where a plant or animal lives under natural conditions

7. Natural resource – a naturally occurring material or organism that supports life, provides fuel, or is used in other ways by humans

8. Nonrenewable natural resource – a resource, such as gold, that cannot be replaced when it is used up

9. Preservation – an attempt to prevent the use of some natural resources or the modification of an environment simply for the sake of keeping it intact

10. Proficiency – FFA awards based largely on students' leadership and innovation in developing successful SAEs

11. Renewable natural resource – a resource – such as air, soil, and wildlife – that can be replaced when it is used

12. Supervised Agriculture Experience (SAE) – the planned application of skills learned in agriculture classes

Unit 2: Soil

1. Cover crop – a crop planted to protect the soil and increase fertility; a crop planted after the harvest of another crop or between the rows of other crops

2. Crop rotation – the alternation of one crop with one or more other crops to promote soil conservation, to improve soil structure, and for numerous other benefits

3. Land capability classes – a system of classifying land based on its highest potential use

4. Organic matter – decaying plant and animal remains

5. Parent material – the mass of mineral and organic matter from which soil is formed

6. Rill erosion – the formation of small channels on sloping land where running water from precipitation washes soil away

7. Sheet erosion – the wearing away of thin layers or sheets of soil

8. Silt fence – a barrier of bales of hay, plastic strips, or other materials placed at the bottom of slopes to allow water to flow through but hold the soil

9. Soil conservation – the use of soil so damage or loss is minimalized

10. Soil erosion – the process by which soil is moved

11. Soil pH – the acidity or alkalinity of soil

12. Soil profile – a vertical section of soil at a specific site

13. Soil texture – the proportion of sand, silt, and clay in soil

14. Soil triangle – a graphic explanation of the proportions of sand, silt, and clay in soil

15. Strip cropping – planting alternating strips of crops on sloping land

16. Terrace – a ridge or row of earth mounds placed across a slope to prevent movement

Unit 3: Water

1. Aquifer – an underground stream or pool in sand or gravel layers
2. Hydrologic cycle – the circulation of water from one part of the hydrosphere to another
3. Irrigation – the artificial application of water to land
4. Surface water – water from lakes, streams, reservoirs, and oceans
5. Watershed – an area of land from which all the water that does not infiltrate the soil runs to a downhill location
6. Water table – the depth of the natural level of free water below the surface of the earth; point in the earth where all the spaces are filled and no more water can be held; natural level of free water below the surface of the earth

Unit 4: Wildlife

1. Amphibian – an animal that lives on land and in water; member of the vertebrate class *Amphibia*
2. Aquatic – an animal that lives in and depends on water for food and reproduction
3. Biennial – a plant that completes its life cycle in two years or growing seasons
4. Canopy – the uppermost layer of a forest that largely consists of the crowns of trees and any plants or animals that may live in tree crowns
5. Community – a collection of plants and animals that live together in a certain harmony
6. Cover – shelter; protection from predators and weather
7. Ectothermic – an animal whose body temperature adjusts to its surroundings; cold-blooded
8. Edge – the location where two habitats meet
9. Endothermic – an animal that maintains a constant body temperature; warm-blooded
10. Home range – the area over which an animal travels
11. Mammals– warm-blooded vertebrate animals characterized by hair on the skin and, in females, mammary glands for nourishing the young
12. Mast – nuts dropped from forest trees, which have accumulated on the ground and are used for food
13. Perennial – a plant that lives for more than two growing seasons or years
14. Population – the total number of people or animals in a location
15. Predator – an animal that consumes another
16. Prey – an animal consumed by a predator

17. Reptile – an animal that has dry skin covered with scales and, except snakes, has two pairs of legs with five clawed toes on each leg
18. Shrub – a perennial plant that grows less than 5 feet in height
19. Terrestrial – an animal that lives on the land
20. Tree – a perennial with one woody stem that supports a crown
21. Understory – the layer located above the shrub layer but beneath the canopy
22. Vine – a plant that climbs or creeps on other plants, the ground, structures, or rocks
23. Wildlife animal – an animal that has not been domesticated

Unit 5: Air

1. Acid rain – any precipitation that is more acidic than normal; rain containing acid
2. Air pollutant – any material that causes air pollution
3. Air pollution – the presence of materials in the air that damage air quality
4. Air quality – the suitability of the air for use by living organisms
5. Air quality standard – the maximum level of atmospheric pollution allowed at one time in a geographical area
6. Emission – a gas-borne pollutant that is released into the air
7. Nonpoint source pollution – pollution from sources that cannot be directly traced to any single point of discharge
8. Particulates – small solid particles of air pollution
9. Point source pollution – a specific place where air pollution originates

Unit 6: Wetlands

1. Biological wetland damage – the damage that occurs when life forms are introduced into or removed from a wetland
2. Bog – a wetland area that contains large amounts of rich organic matter known as peat
3. Chemical wetland damage – damage that results when the water in a wetland is contaminated with chemical substances
4. Estuary – an area where freshwater streams flow into saltwater oceans or lakes
5. Freshwater wetland – wetland with fresh water that can be divided into marshes, bogs, and swamps
6. Marsh – a wetland where the presence of water fluctuates from season to season in accordance with local rainfall
7. Physical wetland damage – damage that results from trying to change a wetland area into another use
8. Saltwater marsh – a wetland area near the ocean that is covered with sea grasses
9. Saltwater wetland – a wetland found along coastlines throughout the world
10. Swamp – a wetland that contains woody plants, such as shrubs and trees; saturated with water in the rainy season and may dry up during the dry season
11. Wetland – an area that, at least periodically, has water covering the ground
12. Wetland restoration – the act of converting former wetlands back into wetlands; the wetland is restored and allowed to return to its natural state; includes re-establishing the hydrology and native vegetation to original condition and protecting the functions and values of wetlands
13. Wet meadow – wetland that floods annually

Unit 7: Waste Management

1. Biodegradable wastes – wastes that can be decomposed by bacteria and other organisms

2. Detoxification – the removal of toxins from a material

3. Domestic wastewater – the wastewater produced by humans in their daily lives from homes, hotels, dormitories, schools, and other nonmanufacturing sources

4. Effluent – the water that flows from a treatment facility or factory into a stream, lake, or ocean; wastewater that usually has been treated to prepare it for release

5. Eutrophication – a deficiency in oxygen that occurs when the water has a nutrient level that is too high

6. Hazardous waste – a solid, liquid, or vapor waste that is potentially dangerous to human health or the environment

7. Health hazard – a condition that endangers human health

8. Landfill – an area of excavated land where wastes are placed for permanent disposal

9. Radioactive waste – a waste that emits radiation of some type

10. Recycling – the reuse of a product or waste material in making something new

11. Solid waste – garbage, refuse, sludge, and other discarded material; nonliquid waste materials that do not dissolve in water or other solvents

12. Spill – an uncontrolled discharge of material

13. Toxicity – the degree to which a waste is poisonous

14. Wastewater – used water that contains dissolved or suspended matter

Unit 8: Biological Processes

1. *Animalia* – the kingdom that consists of about a million species, ranging from tiny spiders and wasps to large whales and elephants; these species differ from plants in that cells do not have walls, food is obtained by eating plants and other animals, and they can move about

2. Compost – a mixture of decaying organic matter used to fertilize soil

3. Consumer – an organism that feeds on producers

4. Decomposer – an organism, such as a mushroom or bacterium, that breaks down the bodies of dead plants and animals

5. *Fungi* – organisms in the kingdom that includes yeasts, mildews, and mushrooms

6. Microbiology – the study of microscopic organisms

7. Microscopic organism – an organism that can be seen only with magnification

8. *Monera* – the kingdom consisting of tiny, one- celled organisms that lack complex cells

9. *Plantae* – the kingdom in which there are about 350,000 species; plants contain many cells and make their food by photosynthesis

10. Producer – an organism that takes nutrients and energy from nonliving sources and makes them into food

11. *Protista* – the kingdom of one-celled organisms that may exist singly or in groups