

Environmental Science

Soils: Apply knowledge of soil characteristics and soil information resources to overcome any existing soil use limitations while maintaining or improving soil quality. 6.1

- 1 Identify soil forming factors and explain how they produce variability in soils. 6.1.1
- 2 Describe the relationship among physical properties of soils. 6.1.2
- 3 Collect, test, and analyze soil samples for physical and chemical properties. 6.1.3
- 4 Identify and describe factors (e.g., climate, soil texture, mineralogy, soil organisms, drainage co-efficient, land use, vegetation types, management practices) affecting organic matter and its function in soil quality. 6.1.4
- 5 Determine land use and identify land capabilities classes. 6.1.5
- 6 Identify and describe soil conservation practices to reduce soil erosion and compaction. 6.1.6
- 7 Compare and contrast the causes and effects of soil erosion. 6.1.7
- 8 Describe soil limitations in agronomic, urban, and natural resource practices. 6.1.8
- 9 Evaluate soil survey data and implement management decisions. 6.1.9
- 10 Assess basic processes (e.g., slope stability, water control, earth material control, vegetative treatment, soil amendments) of soil reclamation. 6.1.10

Water Quality: Analyze, interpret, and manage the biological, chemical, and physical properties of water quality. 6.2

- 1 Assess and explain the interactions between human activities and the Earth's hydrosphere (e.g., septic systems, desalinization, point and non-point source pollution). 6.2.1
- 2 Measure pH, dissolved oxygen (DO), biochemical oxygen demand (BOD), nitrogen, and phosphorus in lentic and lotic waters to determine water quality. 6.2.2
- 3 Measure vegetation, temperature, turbidity, macroinvertebrate populations, and bacterial quality in lentic and lotic waters to determine water quality. 6.2.3
- 4 Explain the hydrological cycle and how human and animal activity impacts the cycle. 6.2.4
- 5 Explain the biotic and abiotic factors affecting water quality. 6.2.5

6 Monitor and analyze water quality and quantity. 6.2.6

7 Identify and describe best management and industry (e.g., agriculture, timber production, construction) production practices that maintain or improve water quality. 6.2.7

Air Quality: Analyze, interpret, and manage the biological, chemical, and physical properties of air quality. 6.3

1 Determine the chemical and physical properties of air (e.g., composition, density, pressure). 6.3.1

2 Explain biogeochemical cycles (e.g., nitrogen, oxygen, sulfur) and how they relate to the biosphere, geosphere, and atmosphere. 6.3.2

3 Explain the effects of carbon dioxide sequestration on air quality. 6.3.3

4 Analyze the importance of air quality to humans and other living organisms. 6.3.4

5 Explain human and natural factors (e.g., transportation, farming practices, greenhouse gases, forest fires, volcanic eruptions) affecting air quality. 6.3.5

6 Monitor and evaluate air composition, quality, and quantity with direct reading instruments (e.g., combustible gases, oxygen, ammonia). 6.3.6

7 Assess the potential for air contamination at a specific site. 6.3.7

8 Identify and describe best management and industry (e.g., agriculture, timber production, construction) production practices that maintain or improve air quality. 6.3.8

Water Use and Management: Collect, analyze, and interpret data for a localized water use and management plan. 6.4

1 Explain the domains of hydrology. 6.4.1

2 Describe the geological and meteorological principles affecting water supplies. 6.4.2

3 Identify and describe types of tests (e.g., Well Yield Test, Pumping Test) used to determine groundwater potential and discharge rates. 6.4.3

4 Identify and describe uses of surface water flow measurements (e.g., stage, stage-discharge curve, peak stage, instantaneous flow, estimation of annual discharge). 6.4.4

5 Interpret surface water flow measurements (e.g., stage, stage-discharge curve, peak stage, instantaneous flow, estimation of annual discharge). 6.4.5

6 Evaluate water collection, storage, and distribution systems (e.g., wells, ponds, runoff, waterways, irrigation). 6.4.6

7 Identify and describe watersheds and their structures (e.g., flowing waters, still water, and upland areas.) 6.4.7

	8 Identify and describe risk factors for potential surface water and groundwater contamination. 6.4.8
	9 Identify and describe best management practices that conserve and sustain water. 6.4.9
Potable Water Treatment: Monitor the water treatment processes for potable water at a specific site. 6.5	1 Identify and assess the characteristics of potable water treatment and the sources of water. 6.5.1
	2 Collect and analyze water samples to determine potability. 6.5.2
	3 Describe components of a water treatment facility. 6.5.3
	4 Monitor the water treatment process (e.g., aeration, flocculation, sedimentation, filtration, disinfection). 6.5.4
	5 Monitor the control and treatment of chemical and biological contaminants (e.g., trihalomethanes, lead, bacteria, nitrates) in water. 6.5.5
	6 Describe taste and odor control in water treatment. 6.5.6
	7 Identify methods for backflow prevention. 6.5.7
Wastewater Operations: Monitor the wastewater collection and treatment methods for a specific site. 6.6	1 Identify the components of a wastewater treatment system. 6.6.1
	2 Collect wastewater samples using industry approved standard operating procedures. 6.6.2
	3 Identify, analyze, and reconcile the components of wastewater samples using industry-approved standard operating procedures. 6.6.3
	4 Identify normal and abnormal conditions in wastewater collection and treatment systems. 6.6.4
	5 Describe the processes of wastewater treatment (e.g., mixing, coagulation, flocculation, disinfection, treatment system, effluent disposal, solids management). 6.6.5
	6 Identify and describe methods for cross-connection and backflow prevention. 6.6.6
	7 Locate, identify, and inventory wastewater assets. 6.6.7
Solid Waste and Renewable Resource Management: Control and process solid waste using current and	1 Collect, analyze, and treat solid waste materials (e.g., livestock mortalities, manure, garbage, food waste). 6.7.1
	2 Distinguish the risks associated with solid waste accumulation, utilization, and disposal. 6.7.2

**alternative
technologies. 6.7**

- 3 Determine an acceptable site for solid waste disposal. 6.7.3**
- 4 Compare the processes of aerobic and anaerobic waste decomposition. 6.7.4**
- 5 Describe and monitor solid waste disposal procedures (e.g., landfill, compost). 6.7.5**
- 6 Describe and monitor solid waste disposal procedures and management procedures (e.g., composting, incineration, recycling, burial, bio-digester). 6.7.6**
- 7 Explain the control processes and potential uses for solid waste byproducts (e.g., leachate, ash, landfill gas, biosolids, methane, manure). 6.7.7**
- 8 Describe standard operating procedures and identify design requirements for specific purposes (e.g., landfill, lagoon, leachate treatment). 6.7.8**
- 9 Evaluate site closure methods and post-closure monitoring. 6.7.9**
- 10 Determine type and volume of solid waste generated by an operation or facility. 6.7.10**

**Contaminants and
Pollution Control:
Assess an affected area,
determine the source
and type of
contaminant, and
respond. 6.8**

- 1 Collect, record, and analyze environmental samples and interpret the results. 6.8.1**
- 2 Determine the types, sources, and impact of natural, human-made contaminants, and high-risk contaminants. 6.8.2**
- 3 Monitor, analyze, and quantify levels of contaminants from point and non-point sources. 6.8.3**
- 4 Monitor noise and light pollution and recommend abatement measures. 6.8.4**
- 5 Describe the environmental impact from both industrial and nonindustrial processes. 6.8.5**
- 6 Identify, comply with, and implement best management practices for contaminant control, remediation, and prevention (e.g., biological, sanitation, buffer strips). 6.8.6**
- 7 Identify, describe, and recommend remediation strategies for the release of contaminant to soil, surface water, or groundwater. 6.8.7**
- 8 Monitor and conduct remediation activities. 6.8.8**
- 9 Identify and describe requirements to develop and implement various emergency response plans. 6.8.9**
- 10 Identify and contact local emergency response teams. 6.8.10**

11 Analyze environmental conditions that influence environmental response. 6.8.11

Hazardous Materials and Waste Management: Follow and apply handling, storage, and recording procedures for hazardous materials and waste. 6.9

- 1 Identify and differentiate solid waste, hazardous waste, toxic waste, and radioactive waste streams.** 6.9.1
 - 2 Describe health and safety practices for reducing risks from hazardous materials (e.g., safety data sheet [SDS], employer notification forms, personal protective equipment [PPE]).** 6.9.2
 - 3 Demonstrate appropriate responses for major types of hazardous materials disasters.** 6.9.3
 - 4 Locate and use information addressing hazardous substance discharge.** 6.9.4
 - 5 Demonstrate safe management, handling, disposal, and recycling procedures for hazardous materials and waste.** 6.9.5
 - 6 Perform site assessments to detect and identify the presence and storage of hazardous materials.** 6.9.6
 - 7 Identify and describe collection procedures for hazardous materials and waste and interpret results.** 6.9.7
 - 8 Identify and describe procedures to transport and store hazardous materials in accordance with regulations.** 6.9.8
 - 9 Prepare and maintain hazardous material handling documentation.** 6.9.9
 - 10 Identify hazardous materials that can be recycled.** 6.9.10
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Ecosystems: Evaluate biotic and abiotic components and relationships in ecosystems to apply restoration and conservation practices that maintain functionality. 6.10

- 1 Describe ecological levels, including population, community, ecosystem, biome, and biosphere.** 6.10.1
 - 2 Distinguish the flow of energy through ecosystems.** 6.10.2
 - 3 Identify and classify interactions among organisms, including predation, symbiosis, and competition, to determine species interdependent relationships.** 6.10.3
 - 4 Describe the process of succession and its impact on ecosystems.** 6.10.4
 - 5 Connect biotic interactions with the abiotic environment.** 6.10.5
 - 6 Describe biogeochemical cycles (e.g., carbon, nitrogen, phosphorous, hydrological) and their roles in maintaining equilibrium in an ecosystem.** 6.10.6
 - 7 Identify interactions of ecosystems to differentiate biomes.** 6.10.7
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8 Select and implement restoration ecology practices to repair damaged ecosystems. 6.10.8

9 Identify and describe impacts of native, non-native, and invasive species on an ecosystem. 6.10.9

10 Describe the relationship between evolution and ecosystems. 6.10.10

**Habitat Management and Restoration:
Develop a plan for the management and restoration of a specific habitat.** 6.11

1 Differentiate the properties and characteristics of habitats. 6.11.1

2 Examine sites and place them into ecological classifications. 6.11.2

3 Evaluate the current and historical (e.g., industrialism, agriculture, climate change) impacts of human interactions on ecosystems and habitats. 6.11.3

4 Identify and differentiate extinct, endangered, extirpated, threatened, and species of concern. 6.11.4

5 Survey and monitor species within a habitat. 6.11.5

6 Explain the role of various stakeholders, including individuals, non-governmental organizations (NGOs), corporations, and governments in habitat restoration and conservation. 6.11.6

7 Implement techniques used in habitat management, mitigation, enhancement, and restoration. 6.11.7

8 Develop a management plan for the restoration and sustainability of a specific habitat using environmental practices that enhance biological diversity. 6.11.8

9 Implement habitat restoration and sustainability management plan environmental practices. 6.11.9

**Parks and Recreational Management:
Demonstrate a basic understanding of the foundation of the park and recreation profession and their associated industries in history, theory, science, and philosophy.** 6.12

1 Identify and describe the principal concept of leisure (Time, Activity, and State of Mind). 6.12.1

2 Identify and describe theories (e.g. flow theory, Csikszentmihalyi, etc.) and how they may be applied to leisure, play, and recreation. 6.12.2

3 Identify and describe legislative and historical events that have significantly impacted leisure, play, and recreation in the United States. 6.12.3

4 Identify and describe the nature and scope of park, recreation, tourism, or related professions and their associated industries. 6.12.4

5 Identify the relationship between a variety of cultural identities (e.g. age, ability, economic class, gender, race, ethnicity) and recreation participation. 6.12.5

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- 6 Identify and describe the leisure needs and opportunities of community that can be facilitated through parks and recreation management. 6.12.6**
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- 7 Identify and describe individual, organizational, and community barriers that can impede engagement in leisure, play, and recreation. 6.12.7**
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- 8 Describe the ways parks, recreation, and associated professions promote economic development in their communities. 6.12.8**
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- 9 Identify ways parks, recreation, and associated professions promote inclusivity across abilities, cultures, and life stages. 6.12.9**