Environmental Science Curriculum Background

The purpose of this plan is to highlight the benefits to the district in moving Biology to 10th grade, and introducing Environmental Science as a 9th Grade Course. This plan would require the development of an Environmental Science course for the upcoming school year. Below is the projected science course selection for each grade level depending upon initial designation from the middle school.

Due to the high level of abstract thinking required in the Biology, Chemistry, and Physics courses, many students are not developmentally ready on a cognitive level for the content taught. This change will align their cognitive development with the appropriate content, allowing greater success across all levels of the science curriculum[1].

There is no cost to the district in developing this course, as any Biology (CSPG No. 032), Chemistry (CSPG No. 34), Physics (CSPG No. 56), Earth & Space (CSPG No. 40) or General Science (CSPG No. 046) certified teacher can teach the course, which means all currently employed staff are able to teach said course. The course does not cost anything to develop, and there will be no real “bump and drop” for scheduling purposes, as teachers can be scheduled to teach the course during their “drop” year.

With the implementation of an Environmental Science course, the school can consider introducing an AP Environmental Science course, raising the profile of the district with its Advanced AP course opportunities.

The movement of biology to 10th grade moves Chemistry to 11th grade and Physics to 12th grade. This movement aligns student math to concurrent or completion of Algebra II with Chemistry, allowing more in depth coverage of the Chemistry curriculum. This also allows Physics students to have Pre-calc/Trig concurrently, allowing the Physics course to properly cover in-depth content.

Moving Biology to 10th grade does not impact AP eligibility for Academic students. In their senior year, all AP courses are available to any student who has completed the course requirements.

[1] Dumontheil, I. (2014). Development of abstract thinking during childhood and adolescence: The role of rostrolateral prefrontal cortex. *Developmental Cognitive Neuroscience, 10*, 57-76. doi:10.1016/j.dcn.2014.07.009

Environmental Science Curriculum

Note: Anchors in parentheses are related to the Biology Keystone

Big Idea: The health of all living things is directly related to the quality of the environment.

Essential Question: How does the quality of the environment affect the health of all living things within it?

Connection to other courses:

- Chemistry: The analysis of the quality of the environment applies basic chemistry (acid rain, pollutants) as well as identifying potential chemicals to clean up the environment and the damage caused by the pollutants.

- Biology: The understanding of biomes and how they should appear compared to how they currently are focuses on changes within the ecosystem, both natural and manmade.

Next Generation Science Standards: HS-LS2-1, HS-LS2-4, HS-LS2-6, HS-ESS2-2, HS-ESS2-4, HS-ESS3-1, HS-ESS3-4

Concepts	Competencies
Human health is affected by pollution.	Analyze the effect of air, water, soil and indoor pollution on society. (BIO.A.2.1.1,B.4.2.3)
Pollution sources can be categorized as either point or non-point.	Identify sources of pollution and explain how they affect the health of the organisms within the ecosystem. (BIO.B.4.2.3, B.4.2.5, B.4.1.1, B.4.2.4, A.4.2.1)
Remediation of pollutants can improve environmental quality for organisms within an ecosystem.	Identify sources of pollution and explain how they affect the health of the organisms within the ecosystem. (BIO.B.4.2.3, B.4.2.5, B.4.1.1, B.4.2.4, A.4.2.1)
Environmental health and biological diversity are affected by human practices.	Analyze the effects of human activities on the health of organisms in an ecosystem (e.g., agricultural, construction, transportation, and industrial practices). (BIO.B.4.2.3, B.4.2.5, B.4.1.1, B.4.2.4, A.4.2.1)
Environmental laws and regulations are developed to aid the health of the environment and all living things including humans.	Analyze how environmental laws and regulations have contributed to the quality and health of ecosystems. (BIO.B.4.2.3, B.4.2.5, B.4.1.1, B.4.2.4)
Intentionally Blank	Describe how naturally occurring changes in earth's systems alter habitats and therefore affect the health of living things.(BIO.B.4.2.3, B.4.2.5, B.4.1.1, B.4.2.4, B.3.1.3, B.3.2.1)

Big Idea: Sustainable use of natural resources is essential to provide for the needs and wants of all living things now and in the future.

Essential Question: How are the needs and wants of all living things (including humans) directly connected to successful management of natural resources?

Connection to other courses:

- Chemistry: The chemical makeup of these natural resources requires basic understanding of periodic table and the elements found there, along with the conversion of energy into a usable source

- Biology: Analysis of the different types of natural resources focuses on biology (in terms of location, availability and impact)

Next Generation Science Standards: HS-PS1-5, HS-PS3-1, HS-PS3-2, HS-LS2-6, HS-LS2-7, HS-ESS3-1, HS-ESS3-4

Concepts	**Competencies**
Pennsylvanians can choose from a variety of alternative energy sources.	Recognize that renewable and nonrenewable natural resources are invaluable in supplying energy and materials used by people. (BIO.B.4.2.3, B.4.2.4 A.2.2.2, B.4.1.2)
Each energy source has positive and negative environmental impacts.	Recognize that renewable and nonrenewable natural resources are invaluable in supplying energy and materials used by people. (BIO.B.4.2.3, B.4.2.4, A.2.2.2, B.4.1.2)
Agriculture and industry use a variety of fossil fuels.	Recognize that renewable and nonrenewable natural resources are invaluable in supplying energy and materials used by people. (BIO.B.4.2.3, B.4.2.4 A.2.2.2, B.4.1.2)
Pennsylvanians use different food and fibers as renewable resources.	Recognize that renewable and nonrenewable natural resources are invaluable in supplying energy and materials used by people. (BIO.B.4.2.3, B.4.2.4 A.2.2.2, B.4.1.2)
Natural occurrences in Pennsylvania's past and future affect natural resources.	Discuss how the availability of our natural resources is dependent on climatic occurrences, available technologies and consumer wants and desires. (BIO.B.4.2.3, B.4.2.4, B.2.4.1)
New technologies affect the use and management of our natural resources.	Discuss how the availability of our natural resources is dependent on climatic occurrences, available technologies and consumer wants and desires. (BIO.B.4.2.3, B.4.2.4, B.2.4.1)
Consumer needs and desires affect the use of our natural resources.	Discuss how the availability of our natural resources is dependent on climatic occurrences, available technologies and consumer wants and desires. (BIO.B.4.2.3, B.4.2.4, B.2.4.1)

Natural resource cycles include extraction, disposal, use and reuse.	Explain how managing natural resources with man-made systems has both limits and economic impacts. (BIO.B.4.2.3, B.4.1.2)
Different regions of the United States as well as other countries use energy sources, fuels and natural resources differently.	Explain how managing natural resources with man-made systems has both limits and economic impacts. (BIO.B.4.2.3, B.4.1.2)
Solid waste disposal is an important part of resource management.	Explain how managing natural resources with man-made systems has both limits and economic impacts. (BIO.B.4.2.3, B.4.1.2)
Natural resources can be managed through reduction, recycling, reuse and use.	Explain how managing natural resources with man-made systems has both limits and economic impacts. (BIO.B.4.2.3, B.4.1.2)
Technological advancements have both increased and decreased society's ability to be sustainable.	Describe in detail how sustainability balances the needs of humans and society with the needs of a natural system. (BIO.B.4.2.3, B.4.2.4, B.4.2.5)
Humans can cause changes directly and indirectly to ecosystems over time.	Describe in detail how sustainability balances the needs of humans and society with the needs of a natural system. (BIO.B.4.2.3, B.4.2.4, B.4.2.5)

Big Idea: Environmental laws and regulations impact humans, the environment, and the economy in both positive and negative ways.

Essential Question: What are the positive and negative effects of environmental laws and regulations on humans, the environment, and the economy?

Connection to other courses:

- Civics: understanding of local, state, and federal laws impacts what interventions/solutions can be implemented, and how resources can be harvested

Concepts	**Competencies**
Laws and regulations exist to protect humans and the environment.	Recognize that laws and regulations exist to protect humans and the environment.
Environmental issues lead to environmental laws and regulations.	Recognize that laws and regulations exist to protect humans and the environment.
Local, state, and federal governments play a role in the development of environmental laws and regulations.	Detail and describe how environmental laws and regulations are developed and enacted.
Disobeying laws and regulations	Analyze both the positive and negative effects environmental laws

carries consequences for individuals and groups.	and regulations have on society and industry.
Conflicts may exist between property owners and environmental laws and regulations.	Analyze both the positive and negative effects environmental laws and regulations have on society and industry.
Environmental laws and regulations influence the actions of people.	Analyze both the positive and negative effects environmental laws and regulations have on society and industry.
Environmental laws and regulations can change over time.	Identify how changes in economic conditions and advances in technology/scientific/environmental knowledge spur change in laws and regulations.

Big Idea: People acting individually and/or as groups influence the environment.

Essential Question: How do humans influence the environment?

Connection to other courses:

- Chemistry: analysis of various chemicals and how they affect yield of a resource, along with any potential toxic byproduct.
- Biology: the impact of various types of extraction of resources on an ecosystem, both short term and long term
- Business/Economics: how consumer perception and demand of a resource affects its availability and price locally, nationally, & globally
- Civics: how local, state, and national laws impact the use of methods of extraction for resources

Next Generation Science Standards: HS-LS1-2, HS-LS2-4, HS-LS2-6, HS-LS2-7, HS-ESS2-5, HS-ESS3-1, HS-ESS3-4, HS-ETS1-1, HS-ETS1-2, HS-ETS1-3

Concepts	**Competencies**
Advances in technologies have determined our ability to extract and utilize natural resources.	Differentiate and describe how availability of natural resources is affected by consumer desires and extracting technologies. (B.4.2.3, B.4.2.4, B.4.2.5)

Consumer desires influence resource availability.	Differentiate and describe how availability of natural resources is affected by consumer desires and extracting technologies. (B.4.2.3, B.4.2.4, B.4.2.5)
A variety of methods exist to process natural resources for human use.	Recognize that humans play a significant role in the management and distribution of resources. (B.4.2.3, B.4.2.4, B.4.2.5, B.3.1.2)
Regional availability of natural resources affects its use and conservation.	Recognize that humans play a significant role in the management and distribution of resources. (B.4.2.3, B.4.2.4, B.4.2.5, B.3.1.2)
Information systems impact management and distribution of natural resources.	Recognize that humans play a significant role in the management and distribution of resources. (B.4.2.3, B.4.2.4, B.4.2.5, B.3.1.2)
Information systems impact management and distribution of natural resources.	Compare and contrast how human practices affect the health of the environment. (B.4.2.3, B.4.2.4, B.4.2.5, B.3.1.2, B.4.2.1, B.4.2.2, B.4.1.2, B.4.1.1)
Man-made systems have inherent costs and benefits that influence how renewable and nonrenewable resources are used.	Recognize that humans play a significant role in the management and distribution of resources. (B.4.2.3, B.4.2.4, B.4.2.5, B.3.1.2)
Human practices can lead to water, air, soil, and indoor pollution.	Compare and contrast how human practices affect the health of the environment. (B.4.2.3, B.4.2.4, B.4.2.5, B.3.1.2, B.4.2.1, B.4.2.2, B.4.1.2, B.4.1.1)
Development and enforcement of laws and regulations targeting pollution have influenced environmental health.	Compare and contrast how human practices affect the health of the environment. (B.4.2.3, B.4.2.4, B.4.2.5, B.3.1.2, B.4.2.1, B.4.2.2, B.4.1.2, B.4.1.1)
A variety of technologies have been developed and implemented to detect point and non-point source pollution.	Intentionally Blank
Various technologies and methods exist to manage solid waste (composting, incinerating, land application, and recycling).	Compare and contrast how human practices affect the health of the environment. (B.4.2.3, B.4.2.4, B.4.2.5, B.3.1.2, B.4.2.1, B.4.2.2, B.4.1.2, B.4.1.1)
Different land use practices and nutrient management systems affect environmental quality.	Explain how advances in agriculture sciences have influenced farming practices and therefore environmental health. (B.2.4.1, B.4.2.3, B.4.2.4)
Laws and regulations affect	Explain how advances in agriculture sciences have influenced

conservation and management practices of food and fiber production.	farming practices and therefore environmental health. (B.2.4.1, B.4.2.3, B.4.2.4)
There are benefits to the environment and society associated with alternative practices used in IPM.	Explain how advances in agriculture sciences have influenced farming practices and therefore environmental health. (B.2.4.1, B.4.2.3, B.4.2.4)
Human actions affect ecosystems.	Describe how human actions affect the balance within an ecosystem. (B.4.2.1, B.4.1.1, B.4.2.4, B.4.2.5, A.3.1.1)
Management strategies exist for the protection of threatened and endangered species.	Describe how human actions affect the balance within an ecosystem. (B.4.2.1, B.4.1.1, B.4.2.4, B.4.2.5, A.3.1.1)
Integrated Pest Management strategies are intended to minimize the detrimental economic and ecological effects of pests including invasive species.	Describe how human actions affect the balance within an ecosystem. (B.4.2.1, B.4.1.1, B.4.2.4, B.4.2.5, A.3.1.1)

Big Idea: Aquatic, terrestrial and human-made ecosystems consist of diverse living and non-living components that change over time and among geographic areas.

Essential Question: How do changes within living and non-living components of aquatic, terrestrial and human systems affect the balance within and between them?

Connection to other courses:

- Chemistry: the introduction of pollutants into an ecosystem and their impacts based on toxicity and concentration of said pollutant

- Biology: the short and long term impacts of pollutants on an aquatic ecosystem, and how this affects adjacent ecosystems

Next Generation Science Standards: HS-LS1-2, HS-LS2-1, HS-LS2-6, HS-LS2-7, HS-ESS2-4, HS-ESS2-5

Concepts	**Competencies**
Scientists use a variety of physical, chemical and biological parameters to determine water quality.	Compare and contrast how adaptations allow a species to fulfill a role in their environment. 1.Analyze the water quality of a particular body of water and infer possible causes for those results based upon land use in the surrounding watershed. (BIO.A.2.1.1, A.2.3.2, B.3.2.1, B.3.1.1, B.3.1.2, B.3.1.3)
Land use within a particular watershed	Compare and contrast how adaptations allow a species to fulfill

will influence water quality.	a role in their environment. 1.Analyze the water quality of a particular body of water and infer possible causes for those results based upon land use in the surrounding watershed. (BIO.A.2.1.1, A.2.3.2, B.3.2.1, B.3.1.1, B.3.1.2, B.3.1.3)
A wide variety of wetland types exist within Pennsylvania.	Describe the importance of wetlands for humans, plants, and animals. (BIO.B.4.1.1, B.4.1.2, B.3.1.1, B.3.1.2, A.2.1.1)
Wetlands serve a number of beneficial functions for humans, plants, animals, and the environment as a whole.	Describe the importance of wetlands for humans, plants, and animals. (BIO.B.4.1.1, B.4.1.2, B.3.1.1, B.3.1.2, A.2.1.1)
Watershed boundaries can include a variety of habitats, ecosystems, and human influences.	Analyze the effect of natural and human events, topography, and geographic location on wetlands, watersheds, aquatic and terrestrial ecosystems. (BIO.B.4.1.1, B.4.1.2, B.4.2.2, B.4.2.4, B.4.2.5)
Biotic and abiotic components within a habitat change, or differ, based on their location and topography.	Analyze the effect of natural and human events, topography, and geographic location on wetlands, watersheds, aquatic and terrestrial ecosystems. BIO.(B.4.1.1, B.4.1.2, B.4.2.2, B.4.2.4, B.4.2.5)
Natural and human events can affect aquatic, terrestrial, and wetland environments in a variety of ways.	Analyze the effect of natural and human events, topography, and geographic location on wetlands, watersheds, aquatic and terrestrial ecosystems. (BIO.B.4.1.1, B.4.1.2, B.4.2.2, B.4.2.4, B.4.2.5)
Organisms within an ecosystem interact with other biotic components, abiotic components and within populations.	Explain in detail the complex interactions that occur among biotic and abiotic components within an ecosystem. (BIO.B.4.1.1, B.4.1.2, A.1.1.1, B.4.2.3, A.3.1.1, A.3.2.1, B.4.2.2)
Abiotic components are critically important for maintaining an ecosystem's homeostasis.	Explain in detail the complex interactions that occur among biotic and abiotic components within an ecosystem. (BIO.B.4.1.1, B.4.1.2, A.1.1.1, B.4.2.3, A.3.1.1, A.3.2.1, B.4.2.2)
Limiting factors affect the carrying capacity of an ecosystem.	Explain in detail the complex interactions that occur among biotic and abiotic components within an ecosystem. (BIO.B.4.1.1, B.4.1.2, A.1.1.1, B.4.2.3, A.3.1.1, A.3.2.1, B.4.2.2)
Ecosystems and their components change over time.	Explain in detail the complex interactions that occur among biotic and abiotic components within an ecosystem. (BIO.B.4.1.1, B.4.1.2, A.1.1.1, B.4.2.3, A.3.1.1, A.3.2.1, B.4.2.2)
A variety of cycles exist within an ecosystem and each helps maintain balance within the ecosystem.	Explain in detail the complex interactions that occur among biotic and abiotic components within an ecosystem. (BIO.B.4.1.1, B.4.1.2, A.1.1.1, B.4.2.3, A.3.1.1, A.3.2.1, B.4.2.2)

Every living organism is uniquely suited to fulfill a role within its ecosystem.	Explain how adaptations, degree of specialization, and behavior of organisms affect the niche they fill within their ecosystem. (BIO.B.4.1.2, A.4.2.1, B.4.2.1, B.4.2.4, B.3.1.1, B.2.1.1, B.4.2.5)
Biological diversity directly impacts the stability of an ecosystem.	Explain how adaptations, degree of specialization, and behavior of organisms affect the niche they fill within their ecosystem. (BIO.B.4.1.2, A.4.2.1, B.4.2.1, B.4.2.4, B.3.1.1, B.2.1.1, B.4.2.5)

Big Idea: Living things depend on their habitat to meet their basic needs.

Essential Question: When investigating different systems (e.g., agriculture, terrestrial, aquatic), how does a habitat meet the needs of a species?

Connection to other courses:

- Chemistry: Agricultural and sewage run-off, and their impacts on ecosystems based on chemicals found in each and the level of concentration, along with the discussion of proper/improper disposal of chemicals. The efficiency of extraction is also discussed, based on the use of chemicals/equipment.

- Biology: The impact on the ecosystem, both short term and long term. In particular the impact on individual organisms and how this affects the ecosystem overall.

Next Generation Science Standards: HS-LS2-1, HS-LS2-2, HS-LS2-4, HS-LS2-6, HS-LS2-7, HS-LS4-5, HS-ESS3-1, HS-ESS3-4, HS-ETS1-1, HS-ETS1-2, HS-ETS1-3

Concepts	**Competencies**
Air, soil, water, and indoor pollution affect human health in a variety of ways.	Recognize that the quality of human health in our society is affected by air, water, soil, and indoor pollution. (BIO.A.2.1.1, B.4.2.3, B.4.2.4, B.4.2.5, B.2.3.1, B.2.1.2)
Wetlands play an important part in pollution control, water quality and human health issues.	Recognize that the quality of human health in our society is affected by air, water, soil, and indoor pollution. (BIO.A.2.1.1, B.4.2.3, B.4.2.4, B.4.2.5, B.2.3.1, B.2.1.2)
The misuse of natural resources can negatively affect the sustainability of society.	Recognize that the quality of human health in our society is affected by air, water, soil, and indoor pollution.(BIO.A.2.1.1, B.4.2.3, B.4.2.4, B.4.2.5, B.2.3.1, B.2.1.2)
There are costs and benefits associated with cleaning up contaminants.	Discuss how economic factors affect human health issues like pollution control, clean-up and contaminant disposal. (BIO.A.2.1.1, B.4.2.3, B.4.2.4, B.4.2.5, B.2.3.1, B.2.1.2)

Common household cleaning products and their by-products have specific manufacturing and disposal requirements.	Discuss how economic factors affect human health issues like pollution control, clean-up and contaminant disposal. (BIO.A.2.1.1, B.4.2.3, B.4.2.4, B.4.2.5, B.2.3.1, B.2.1.2)
Because natural resources like coal, water, oil and timber have economic influences, their availability can determine the local community's prosperity.	Discuss how economic factors affect human health issues like pollution control, clean-up and contaminant disposal. (BIO.A.2.1.1, B.4.2.3, B.4.2.4, B.4.2.5, B.2.3.1, B.2.1.2)
Pennsylvania's food and fiber industry is a major factor in state economy.	Explain how agriculture plays a major role in the economy and culture of the United States. (BIO.B.2.4.1, B.4.2.1, BIO.B.4.2.3)
There are a variety of laws related to the food and fiber industry.	Explain how agriculture plays a major role in the economy and culture of the United States. (BIO.B.2.4.1, B.4.2.1, BIO.B.4.2.3)
A steady or increased demand for a particular natural resource can affect the environment.	Explain how agriculture plays a major role in the economy and culture of the United States. (BIO.B.2.4.1, B.4.2.1, BIO.B.4.2.3)
New technologies used in industries can increase the efficiency and prolong the supply of some natural resources.	Explain how agriculture plays a major role in the economy and culture of the United States. (BIO.B.2.4.1, B.4.2.1, BIO.B.4.2.3)
Diverse biomes exist in Pennsylvania.	Explain how agriculture plays a major role in the economy and culture of the United States. (BIO.B.2.4.1, B.4.2.1, B.4.2.3, B.4.1.2)
Diverse biomes exist in Pennsylvania.	Describe in detail how the living and non-living components of an ecosystem interrelate and directly impact food chains and energy flow. (BIO.B.4.2.1, B.4.1.2, A.3.1.1, A.3.2.1)
The biotic and abiotic components within an ecosystem interact.	Describe in detail how the living and non-living components of an ecosystem interrelate and directly impact food chains and energy flow. (BIO.B.4.2.1, B.4.1.2, A.3.1.1, A.3.2.1)
Organisms have specific roles in ecosystems.	Intentionally Blank
Specific habitat management practices influence the success or failure of species.	Intentionally Blank
Scientists use specific criteria to categorize organisms as threatened, endangered or extinct.	Intentionally Blank

Big Idea: Humans depend upon the management and practices of agricultural systems.

Essential Question: In what ways are human societies and cultures impacted by management and practices of agricultural systems?

Connection to other courses:

- Chemistry: The use of chemicals (pesticides, herbicides, fertilizers) in agriculture, and the pros/cons of each.

- Biology: How the use of chemicals (pesticides, herbicides, fertilizers) impact the growth and development of individual organisms and species at large, and the overall impact this has on the ecosystem.

- Business/Economics: How the use of chemicals (pesticides, herbicides, fertilizers) impact supply and demand, along with consumer perception of a product

Next Generation Science Standards: HS-LS1-2, HS-LS2-1, HS-LS2-7, HS-ESS2-2, HS-ESS2-4, HS-ESS2-5, HS-ESS3-1, HS-ESS3-4, HS-ETS1-1, HS-ETS1-2, HS-ETS1-3

Concepts	**Competencies**
Agriculture has influenced culture, standard of living and foreign trade.	Identify how agriculture is vitally important in meeting the needs of society and maintaining the economy of Pennsylvania. (B.4.2.3, B.2.4.1, B.4.2.2)
Laws and regulations affect conservation and management of food and fiber production.	Identify how agriculture is vitally important in meeting the needs of society and maintaining the economy of Pennsylvania. (B.4.2.3, B.2.4.1, B.4.2.2)
Agricultural science influences farming practices, efficiency, and nutrition over time.	Recognize that agricultural sciences and technologies strive to increase efficiency while balancing the needs of society with the conservation of our natural resources. (B.4.2.3, B.2.4.1, B.4.2.2)
Technological advancements increase efficiency in production and environmental impacts of agriculture.	Recognize that agricultural sciences and technologies strive to increase efficiency while balancing the needs of society with the conservation of our natural resources. (B.4.2.3, B.2.4.1, B.4.2.2)
Integrated pest management (IPM) carries both benefits and risks when associated with agriculture.	Recognize that agricultural sciences and technologies strive to increase efficiency while balancing the needs of society with the conservation of our natural resources. (B.4.2.3, B.2.4.1, B.4.2.2)
Growing conditions throughout the United States determine which plants	Describe how agricultural components and systems affect – and are affected by – social, political, environmental, and economic

and animals are most suitable to each region.	factors. (B.4.2.3, B.2.4.1, B.4.2.2)
Society's needs and standard of living directly impact the sustainability of natural resources.	Recognize that sustainability of natural resources fluctuates based on society's needs or wants and the technological advances used. (B.4.2.3, B.2.4.1, B.4.2.2)
Natural resource use and availability affect the sustainability of society.	Recognize that sustainability of natural resources fluctuates based on society's needs or wants and the technological advances used. (B.4.2.3, B.2.4.1, B.4.2.2)
Technological advancements have changed society's standard of living and affected the sustainability of natural resources.	Recognize that sustainability of natural resources fluctuates based on society's needs or wants and the technological advances used. (B.4.2.3, B.2.4.1, B.4.2.2)
Human activity affects ecosystems for better or worse.	Discuss and describe how human activities cause changes within ecosystems – positively, negatively, or both. (B.4.2.3, B.2.4.1, B.4.2.2, B.4.2.4, B.4.2.5)
Human and societal supply and demand impact the environment in a variety of ways.	Discuss and describe how human activities cause changes within ecosystems – positively, negatively, or both. (B.4.2.3, B.2.4.1, B.4.2.2, B.4.2.4, B.4.2.5)

Big Idea: The survival of living things is dependent upon their adaptations and ability to respond to natural changes in and human influences on the environment.

Essential Questions: How is the survival of species and their ability to adapt affected by natural and human induced environmental changes?

Connection to other courses:

- Chemistry: The various types of chemicals used in resource management, and the impact this has on species and ecosystems, both short term and long term
- Biology: How man-made changes in an ecosystem impact the evolution and growth of species, and how the endangerment & extinction of these species impacts ecosystems, both short term and long term
- Civics: The impact of local, state, and federal laws on species and their survival.

Next Generation Science Standards: HS-LS1-2, HS-LS2-1, HS-LS2-2, HS-LS2-6, HS-LS2-7, HS-LS4-5, HS-ESS3-1

Concepts	**Competencies**

Species must be able to adapt to changes within their ecosystem in order to survive.	Explain how specialization and generalization influence a species' survival. (B.3.1.2, B.3.1.3, B.3.1.1, B.2.1.1)
The degree of specialization of a species can cause it to become threatened, endangered, or extinct.	Explain how specialization and generalization influence a species' survival. (B.3.1.2, B.3.1.3, B.3.1.1, B.2.1.1)
Animal species can be classified as generalists or specialists in their eating habits.	Explain how specialization and generalization influence a species' survival. (B.3.1.2, B.3.1.3, B.3.1.1, B.2.1.1)
Habitat destruction can lead to species loss or termination.	Explain how specialization and generalization influence a species' survival. (B.3.1.2, B.3.1.3, B.3.1.1, B.2.1.1)
The intervention of humans has influenced the survival of species through management practices.	Analyze how human attempts at species management have influenced the species' success or failure. (B.3.1.2, B.3.1.3, B.3.1.1, B.2.1.1, B.4.2.4)
Human endeavors and changes in natural cycles have caused species to become threatened, endangered, or extinct.	Describe how a species' adaptability determines its ability to survive rapid environmental changes due to human activities. (B.3.1.2, B.3.1.3, B.3.1.1, B.2.1.1, B.4.2.4)
Environmental laws and regulations have been implemented in an attempt to protect species diversity.	Analyze the positive and negative impacts of an environmental law on a given species and society.

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