

NGSS Key:

LS = Life Science

ESS = Earth & Space Science

PS = Physical Science

ETS = Engineering, Technology, and Applications of Science

Ag Environmental Studies

Unit & Topics	NGSS Alignment
<p>Unit 1: Introduction to Environmental Science Intro to Environmental Science</p> <ul style="list-style-type: none">● Environmental science v. ecology v. environmental activism● Renewable and nonrenewable resources● Tragedy of the Commons● Ecological footprints <p>Scientific Processes</p> <ul style="list-style-type: none">● Scientific methods● Quantitative v. qualitative data● Science v. pseudoscience● Peer review process● Scientific theory v. law <p>Economics & Policy</p> <ul style="list-style-type: none">● What are economics?● Ecosystem services● Cost-benefit analyses● Types of environmental policies (regulatory v. incentive)	<ul style="list-style-type: none">● HS-LS2-7● HS-ETS1-1● HS-ETS1-2● HS-ESS3-1● NGSS Practices:<ul style="list-style-type: none">○ Asking questions & defining problems○ Planning & carrying out investigations○ Analyzing & interpreting data○ Using mathematics & computational thinking○ Obtaining, evaluating, & communicating information
<p>Unit 2: Biosphere 1 - Basic Ecology Spheres of the Earth</p> <ul style="list-style-type: none">● Hydrosphere, geosphere, atmosphere, biosphere, cryosphere● Interactions between spheres <p>Basics of Ecology</p> <ul style="list-style-type: none">● Biotic v. abiotic factors● Organization of living things	<ul style="list-style-type: none">● HS-LS1-6● HS-ESS2-2● HS-LS2-1● HS-LS1-5● HS-LS2-4● HS-LS2-8

<ul style="list-style-type: none"> ● Habitat v. niche <p>Organism Relationships</p> <ul style="list-style-type: none"> ● Food chains v. food webs ● Energy pyramid and trophic levels ● Conservation of energy and First Law of Thermodynamics ● Symbiotic relationships ● Prey adaptations 	
<p>Unit 3: Biosphere 2 - Species & Population Ecology</p> <p>Species</p> <ul style="list-style-type: none"> ● Definition of species ● Endangered v. threatened species ● Endangered Species Act ● Speciation Interspecific competition <p>Populations and Population Growth</p> <ul style="list-style-type: none"> ● Linear v. exponential growth ● Logistic growth ● S curve v. J curve ● Limiting factors ● Carrying capacity ● Natality, fecundity, fertility, mortality, life expectancy ● Survivorship curves (Types 1, 2, & 3) ● R strategists v. K strategists ● Age Structure Diagrams 	<ul style="list-style-type: none"> ● HS-LS2-2 ● HS-LS2-6 ● HS-LS2-7 ● HS-ESS3-4 ● HS-LS2-1 ● HS-ESS3-1 ● HS-ETS1-1
<p>Unit 4: Biosphere 3- Communities, Biomes, and Biodiversity</p> <p>Biomes</p> <ul style="list-style-type: none"> ● 9 different world biomes ● Climate v. weather ● Climatograms <p>Communities & Ecological Succession</p> <ul style="list-style-type: none"> ● Keystone species ● Indicator species ● Primary v. Secondary succession, climax community, pioneer species <p>Biodiversity</p> <ul style="list-style-type: none"> ● Types of biodiversity 	<ul style="list-style-type: none"> ● HS-LS2-1 ● HS-LS2-7 ● HS-LS4-6 ● HS-ESS2-2 ● HS-ETS1-2 ● HS-LS2-6 ● HS-LS2-2

<ul style="list-style-type: none"> ● Biodiversity index ● Sampling methods ● Invasive species 	
<p>Unit 5: Atmosphere & Biogeochemical Cycles</p> <p>Composition & Layers of the Atmosphere</p> <ul style="list-style-type: none"> ● Atmospheric composition ● Composition of early atmosphere ● Layers of the atmosphere ● Temperature trends in each layer of the atmosphere ● Function and importance of ozone layer <p>Weather</p> <ul style="list-style-type: none"> ● Tilt of the earth, seasons, and solar radiation ● Global circulation Coriolis Effect ● ENSO (El Nino, La Nina) ● Weather maps Effects of deforestation on local and global weather <p>Biogeochemical cycles</p> <ul style="list-style-type: none"> ● Nutrient sources, sinks, and reservoirs ● Nitrogen cycle ● Phosphorous cycle ● Carbon cycle ● Human impacts on the nitrogen, phosphorous and carbon cycles ● Greenhouse gases and global warming (climate change) 	<ul style="list-style-type: none"> ● HS-ESS2-2 ● HS-ESS2-4 ● HS-ESS2-7 ● HS-ESS3-5 ● HS-ESS3-6 ● HS-ESS2-6 ● HS-ESS3-1 ● HS-LS2-5
<p>Unit 6: Geosphere 1 - Plate Tectonics</p> <p>Plate Tectonics</p> <ul style="list-style-type: none"> ● Layers of the earth ● Evidence for plate tectonics & continental drift ● Types of plate boundaries ● Landforms at plate boundaries ● Environmental disturbances ● Ecosystem resistance and resilience ● Rain shadow effect 	<ul style="list-style-type: none"> ● HS-ESS2-2 ● HS-ESS2-3 ● HS-ESS2-7 ● HS-ESS3-1 ● HS-LS2-6 ● HS-ETS1-2 ● HS-ETS1-3

Unit 7: Geosphere 2 - Minerals, Mining, & Soil

Minerals, Rocks, & Mining

- Characteristics and properties of minerals
- Use of minerals in everyday life
- Mining methods and impacts (surface v. subsurface, restoration v. reclamation)
- Preservation of mineral deposits
- Types of rocks (igneous, sedimentary, metamorphic) and their properties
- Rock cycle

Soil Composition & Conservation

- Formation of soil
- Soil horizons and profile
- Soil particles (sand, silt, clay)
- Porosity and permeability of soil
- Soil erosion by wind and water
- Soil conservation methods

- HS-ESS2-2
- HS-ESS3-1
- HS-ESS3-3
- HS-ESS3-4
- HS-ESS3-6
- HS-LS2-7
- HS-ETS1-1
- HS-ETS1-2
- HS-ETS1-3
- HS-ESS2-5
- HS-ESS2-7
- HS-ESS3-2

Unit 8: Geosphere 3 - Fossil Fuels & Renewable Energy

Energy

- What is Energy?
- Renewable v. nonrenewable energy
- Mechanics of energy generation

Fossil Fuels and Renewable Energy

- Pros and cons of each energy type
- Distribution of energy resources
- Impacts of energy sources
- Energy conservation

- HS-PS3-2
- HS-PS3-3
- HS-LS2-7
- HS-ESS3-4
- HS-ESS3-1
- HS-ESS3-2
- HS-ETS1-1
- HS-ETS1-2
- HS-ETS1-3

Unit 9: Hydrosphere 1 - Surface Water & Groundwater

Introduction to Water & The Hydrologic Cycle

- Unique properties of water
- Processes in the water cycle
- Human impacts on the water cycle

Surface Water & Watersheds

- HS-ESS2-2
- HS-ESS2-5
- HS-ESS3-5
- HS-LS2-6
- HS-ESS3-1
- HS-ESS3-4
- HS-ESS3-6
- HS-LS4-6
- HS-ETS1-3

<ul style="list-style-type: none"> ● Watersheds ● Eutrophication and acidification of aquatic ecosystems ● Structure and impact of dams ● Benefits of riparian buffers <p>Groundwater & Irrigation</p> <ul style="list-style-type: none"> ● Water table ● Aquifers (confined v. unconfined) ● Types of irrigation ● Human impacts from groundwater usage 	<ul style="list-style-type: none"> ● HS-ESS3-2 ● HS-ESS3-3 ● HS-LS2-7
<p>Unit 10: Hydrosphere 2 - Marine Biomes, Wetlands & Water Pollution</p> <p>Marine Biomes</p> <ul style="list-style-type: none"> ● Types of aquatic biomes ● Adaptations for the intertidal zone ● Ocean productivity and nutrients in ocean food webs ● Ocean zones ● Oil spills and clean-up methods ● Aquaculture v. Fishing ● Coral bleaching <p>Wetlands & Water Pollution</p> <ul style="list-style-type: none"> ● Water Quality ● Point-source v. nonpoint-source pollution ● Microplastic pollution ● Oxygen sag curve and nutrient pollution ● Effects of pollution on aquatic ecosystems ● Persistent Organic Pollutant (POPs) ● Bioaccumulation v. biomagnification ● Bioassays and LD50 ● Characteristics of wetlands ● Environmental benefits of wetlands 	<ul style="list-style-type: none"> ● HS-ESS2-2 ● HS-ESS2-7 ● HS-ESS3-3 ● HS-ESS3-4 ● HS-ESS3-6 ● HS-LS2-5 ● HS-LS2-6 ● HS-LS2-7 ● HS-ETS1-1 ● HS-ETS1-3 ● HS-ESS-3-1 ● HS-ESS3-2 ● HS-LS-2-3 ● HS-LS4-6 ● HS-ETS1-2 ● HS-ETS1-4
<p>Unit 11: Human Impact - Land Use & Sustainability</p> <p>Urbanization & Land Use</p>	<ul style="list-style-type: none"> ● HS-ESS2-2 ● HS-ESS3-1 ● HS-ESS3-3 ● HS-ESS3-4

<ul style="list-style-type: none"> ● Development of villages & cities from hunting & gathering ● Environmental impacts of cities ● Human health impacts of cities ● Heat islands ● Urban sprawl ● City planning and smart growth <p>Sustainable Forestry</p> <ul style="list-style-type: none"> ● 3 E's of sustainability (economics, environment, equity) ● Economic and environmental benefits of trees ● Deforestation and reforestation <p>Sustainable Agriculture</p> <ul style="list-style-type: none"> ● The Green Revolution ● Agricultural impacts on the environment ● Sustainable practices in agriculture ● Organic v. traditional farming ● Vertical farming and other future agricultural techniques ● Genetically modified organisms (GMOs) 	<ul style="list-style-type: none"> ● HS-ESS3-6 ● HS-ETS1-1 ● HS-ETS1-2 ● HS-ETS1-3 ● HS-LS2-7 ● HS-ESS2-6 ● HS-LS2-4 ● HS-LS2-5 ● HS-LS2-6 ● HS-ESS3-5 ● HS-LS2-2
---	--