NEPTUNE TOWNSHIP SCHOOL DISTRICT

Environmental Science

Curriculum

Grades 6-8

NEPTUNE TOWNSHIP SCHOOL DISTRICT
Office of the Superintendent
60 Neptune Blvd.
Neptune, NJ 07753-4836

March 29, 2023 Document C1#1

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NEPTUNE TOWNSHIP SCHOOL DISTRICT

ENVIRONMENTAL SCIENCE
GRADES 6-8
CURRICULUM

Table of Contents

Curriculum

NEPTUNE TOWNSHIP SCHOOL DISTRICT

Environmental Science

Acknowledgements

The Environmental Science Curriculum guide was developed for Neptune Middle School through the efforts of Shane Toohey, middle school science teacher in collaboration with Dolores Dalelio, Department Chairperson; Stacie Ferrara, Ed.D., Supervisor of STEM, and Sally A. Millaway, Ed.D., Director for Curriculum, Instruction, and Assessment.

This curriculum guide is aligned to the 2020 New Jersey Department of Education Students Learning Standards for Science and includes instructional strategies and resources that focus on developing scientifically literate students. This curriculum guide is designed around a student-centered approach and provides the opportunity for students to explore the human impact on the environment.

The committee members are commended for their dedication in creating this curriculum guide. It is our hope that this guide will serve as a valuable resource for the staff members who teach this course and that they will feel free to make recommendations for its continued improvement.

NEPTUNE TOWNSHIP SCHOOL DISTRICT

DISTRICT MISSION STATEMENT

The primary mission of the Neptune Township School District is to prepare all of our students for a life-long learning process and to become confident, competent, socially- and culturally-conscious citizens in a complex and diverse world. It is with high expectations that our schools foster:

- A strong foundation in academic and modern technologies
- A positive, equitable, and varied approach to teaching and learning
- An emphasis on critical thinking skills and problem-solving techniques
- A respect for and an appreciation for our world, its resources, and its diverse people
- A sense of responsibility, good citizenship, and accountability.
- An involvement by the parents and the community in the learning process

Neptune Township School District

Educational Outcome Goals

The students in the Neptune Township schools will become life-long learners and will:

- Become fluent readers, writers, speakers, listeners, and viewers with comprehension and critical thinking skills.
- Acquire the mathematical skills, understandings, and attitudes that are needed to be successful in their careers and everyday life.
- Understand fundamental scientific principles, develop critical thinking skills, and demonstrate safe practices, skepticism, and open-mindedness when collecting, analyzing, and interpreting information.
- Become technologically literate.
- Demonstrate proficiency in all New Jersey Student Learning Standards (NJSLS).
- Develop the ability to understand their world and to have an appreciation for the heritage of America with a high degree of literacy in civics, history, economics and geography.
- Develop a respect for different cultures and demonstrate trustworthiness, responsibility, fairness, caring, and citizenship.
- Become culturally literate by being aware of the historical, societal, and multicultural aspects and implications of the arts.
- Demonstrate skills in decision-making, goal setting, and effective communication, with a focus on character development.
- Understand and practice the skills of family living, health, wellness and safety for their physical, mental, emotional, and social development.
- Develop consumer, family, and life skills necessary to be a functioning member of society.
- Develop the ability to be creative, inventive decision-makers with skills in communicating ideas, thoughts and feelings.
- Develop career awareness and essential technical and workplace readiness skills, which are significant to many aspects of life and work.

ENVIRONMENTAL SCIENCE
GRADES 6-8

COURSE DESCRIPTION

This course is intended for students in grades 6th, 7th, and 8th as an introduction to environmental issues impacting Monmouth and Ocean Counties with a focus on Neptune Township. Students will take field trips to key local destinations to see the problems first hand. For the Blue Environmental Sciences, these trips will include the use of the district's A.N.S.W.E.R. boat to explore the Shark River, the inlet, and the Atlantic Ocean. For the Green Environmental Sciences, these trips may include a visit to a local forest. Students will work on a culminating project to propose solutions to the issues they find.

INTEGRATED SOCIAL AND EMOTIONAL LEARNING COMPETENCIES

The following social and emotional competencies are integrated in this curriculum document:

Self-Awareness	
x	Recognize one's own feelings and thoughts
x	Recognize the impact of one's feelings and thoughts on one's own behavior
	Recognize one's personal traits, strengths and limitations
x	Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	
x	Understand and practice strategies for managing one's own emotions, thoughts and behaviors
x	Recognize the skills needed to establish and achieve personal and educational goals
	Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one's goals
Social Awareness	
x	Recognize and identify the thoughts, feelings, and perspectives of others
x	Demonstrate an awareness of the differences among individuals, groups, and others' cultural backgrounds
x	Demonstrate an understanding of the need for mutual respect when viewpoints differ
x	Demonstrate an awareness of the expectations for social interactions in a variety of setting
Responsible Decision Making	
x	Develop, implement and model effective problem solving and critical thinking skill
x	Identify the consequences associated with one's action in order to make constructive choices
x	Evaluate personal, ethical, safety and civic impact of decisions.
Relationship Skills	
x	Establish and maintain healthy relationships
x	Utilize positive communication and social skills to interact effectively with others
x	Identify ways to resist inappropriate social pressure
	Demonstrate the ability to present and resolve interpersonal conflicts in constructive ways
	Identify who, when, where, or how to seek help for oneself or others when needed

Unit Plan Title	Laboratory Safety
Suggested Time Frame	2-3 days

Overview / Rationale
Safety in the laboratory and classroom setting is important for students and teachers. Safety is reviewed in science courses at the beginning of each school year and should be demonstrated and adhered to by teachers and students in all laboratory activities including demonstrations and lab investigations.

Stage 1 – Desired Results	
Established Goals: Teachers have a duty of care to demonstrate, model and ensure classroom safety for all students and staff with all activities planned in lessons including but not limited to any that utilize laboratory equipment, materials and chemicals.	
Essential Questions: ● How can accidents and injuries be avoided in the classroom and laboratory settings? ● What steps should be taken to respond to emergencies and accidents in the classroom, laboratory and workplace setting?	**Enduring Understandings:** ● Safety precautions are important for all areas of life and should be practiced by everyone on a daily basis. ● It is important that safety practices are understood and exercised in the classroom, laboratory, and on the job.
Knowledge: *Students will know…* ● Lab safety rules and expectations ● Names and uses of lab equipment ● Location and use of safety equipment	**Skills:** *Students will be able to…* ● Explain appropriate health and safety practices in the classroom and laboratory. ● Identify common hazards in the classroom and laboratory. ● Identify name and the use of specific lab equipment ● Explain how to respond to various safety situations and accidents. ● Demonstrate how to use basic lab equipment and safety equipment.

Interdisciplinary Connections
New Jersey Student Learning Standards- English Language Arts (2016): NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed. **New Jersey Student Learning Standards-Career Readiness,Life Literacies, and Key Skills (2020)** 9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2). 9.4.8.CT.3: Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome. **New Jersey Student Learning Standards-Computer Science and Design Thinking (2020)** 8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.

Student Resources
HS Safety Contract (Flinn) https://www.flinnsci.com/high-school-student-safety-contract---english/dc10494/ MS Safety Contract (Flinn) https://www.flinnsci.com/middle-school-science-safety-contract/dc10642/ Spanish version available online https://www.flinnsci.com/middle-school-science-safety-contract---spanish/dc10643/
Teacher Resources
Flinn Safety Course for teachers online (free with registration) https://labsafety.flinnsci.com/ NSTA Safety Resources https://www.nsta.org/topics/safety Duty of Care https://static.nsta.org/pdfs/DutyOfCare.pdf Safety and the NGSS https://static.nsta.org/pdfs/Safety%20and%20the%20Next%20Generation%20Science%20Standards_29Oct2020_FINAL.pdf

Safety Practices with Demonstrations
https://static.nsta.org/pdfs/MinimumSafetyPracticesAndRegulations.pdf

Labeling of Chemicals
https://static.nsta.org/pdfs/GloballyHarmonizedSystemOfClassificationAndLabelingOfChemicals.pdf

Eye Protection
https://www.nsta.org/eye-protection-and-safer-practices-faq

Stage 2 – Assessment Evidence

Pre-Assessments:

Q&A Safety- What do you know?

Formative Assessments:

Pre-lab discussions should be included in all lessons when an activity is planned.
Lab equipment- names and uses
Room layout and safety equipment location.
Use of Safety equipment- eye wash, hood, fire blanket, fire extinguisher

Summative Assessments:

Safety Test- teacher/department created

Performance Task(s):

Safety Practical

Unit Plan Title	Blue Environmental (Grade 6)
Suggested Time Frame	40 lessons (one marking period)

Overview / Rationale
In this section the students will learn about local issues with our freshwater streams in Neptune Township. They will also be developing a monitoring system for tow locations that they will carry out.

Stage 1 – Desired Results

Established Goals:

New Jersey Student Learning Standards- Science (2020)

MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

MS-ESS2-4 Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems**.**

Essential Questions:	**Enduring Understandings:**
● What drives the water cycle? ● How does the water cycle help spread the pollution around? ● What is a bio-indicator? ● How can we track pollution and prevent it or remove it from an ecosystem?	● Organisms are linked to one another in an ecosystem by the flow of energy and the cycling of materials. ● Ecosystems change over time. ● Disruptions to any part of an ecosystem can lead to shifts in all of its populations. ● Human activities can alter the stability of ecosystems. ● Through education and proactive approaches, humans can help restore balances to an ecosystem.

Knowledge: *Students will know…*	**Skills:** *Students will be able to…*
● All populations living together (biotic factors) and the physical factors with which they interact (abiotic factors) compose an ecosystem. ● Humans can alter the living and nonliving factors within an ecosystem, thereby creating changes to the overall system. ● Major issues that affect the health of the watershed (development, pollution, loss of habitat, changing demographics, road building, etc.). ● A watershed is the area of land which the water traveled to reach the mouth of the river. ● Macroinvertebrates are more sensitive to water quality than fish; therefore the presence or absence of these animals is a far better indicator of the waterway's health than sampling fish populations. ● Buffer zones lessen the amount of pollution entering the waterway; tree, shrub, and groundcover roots hold soil in place which prevents erosion and sediments entering the waterway; they allow precipitation to filter through the soil slowly and recharge groundwater supplies as well as prevent flooding to surface water supplies. ● The degree of permeability affects the quality and quantity of surface water supplied. ● The impacts of erosion and sedimentation on humans and wildlife in the Shark River ● In all environments organisms with similar needs may compete with one another for resources including food, water, air, space and shelter. This competition results in natural population fluctuations. Growth of organisms and population increases are limited by access to resources.	● Ask questions for scientific inquiry. ● Define problems and design solutions. ● Plan and carry out investigations. ● Analyze and interpret data. ● Construct scientific explanations. ● Distinguish between biotic and abiotic factors. ● Use various indicators (pH, turbidity, dissolved oxygen, nitrates, phosphates, salinity, macro-invertebrate surveys, etc.) to establish the health of local bodies of water. ● Investigate, through the use of models, how water acts as a solvent and as it passes through the watershed it dissolves natural materials and pollutants and carries them to surface water and groundwater supplies. ● Use topographic maps to locate local watersheds and to identify the bodies of water into which they drain. ● Explain the impact of human activities (e.g., building roads, fertilizing golf courses, etc.) on the quality of local waters. ● Describe and explain how factors (i.e., space, food, water, disease) limit the number of organisms an ecosystem can support. ● Research and analyze data on human population changes that have occurred over time in surrounding communities. Discuss reasons for changes in human population and explain how these changes have affected the biodiversity of local organisms and availability of natural resources in the given ecosystem (e.g., habitat loss, water quality, preservation/conservation efforts). ● Develop a model to describe the 5 organisms and population increases are limited by access to resources. cycling of water. ● Interpret USGS topographic symbols and colors and locate the Shark River and key "spaces" within its watershed (parks, golf courses, and shopping centers). ● Differentiate between pervious and impervious surfaces.

	● Construct an argument to support that organisms are affected by physical and/or biological changes in their habitats. ● Differentiate between point and nonpoint source pollution and identify sources of each. ● Develop a model to describe the flow of energy (food web) and consider potential impacts to food webs.

Interdisciplinary Connections
New Jersey Student Learning Standards- English Language Arts (2016): RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts. RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics. RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic. RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. Integration of Knowledge and Ideas RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). RST.6-8.8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. **New Jersey Student Learning Standards- Mathematics (2016):** 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. 6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. 6.SP.B.4 Summarize numerical data sets in relation to their context. **New Jersey Student Learning Standards- Career Readiness,Life Literacies, and Key Skills (2020)** 9.1.8.CR.2: Compare various ways to give back through strengths, passions, goals, and other personal factors.

9.1.8.CR.3: Relate the importance of consumer, business, and government responsibility to the economy and personal finance.
9.1.8.CDM.2: Demonstrate an understanding of the terminology associated with different types of credit (e.g., credit cards, installment loans, mortgages, lines of credit) and compare and calculate the interest rates associated with each.
9.1.8.CR.4: Examine the implications of legal and ethical behaviors when making financial decisions.

New Jersey Student Learning Standards-Computer Science and Design Thinking (2020)
8.2.8.ED.1 Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
8.2.8.ED.3 Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).
8.2.8.ITH.4 Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact.
8.2.8.ETW.2 Analyze the impact of modifying resources in a product or system (e.g., materials, energy, information, time, tools, people, capital).

Student Resources

- Google Classroom
- ChromeBook

Teacher Resources

- *Project Wet* (2011) Project Wet Foundation (ISBN 978-1888631807)
- New Jersey Audubon Society https://njaudubon.org/
- *Bridges to the Natural World* (2003) https://njaudubon.org/wp-content/uploads/2020/03/NJAudubon.BridgestotheNaturalWorld.pdf

K-12 NJDOE Legislation
Amistad Law N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Diversity and Inclusion Law (N.J.S.A. 18A:35-4.36a)
Beginning in the 2021-2022 school year, each school district shall incorporate instruction on diversity and inclusion in an appropriate place in the curriculum of students in grades kindergarten through 12 as part of the district's implementation of the New Jersey Student Learning Standards.

Holocaust Law (N.J.S.A. 18A:35-28) Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and

secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law (N.J.S.A. 18A:35-4.35) A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards. N.J.S.A.18A:35-4.36 A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Lyme Disease Prevention (N.J.S.A. 18A:35-5.1) Requires the development of Lyme disease curriculum guidelines. The guidelines shall emphasize disease prevention and sensitivity for victims of the disease. The Commissioner of Education shall periodically review and update the guidelines to ensure that the curriculum reflects the most current information available.

Stage 2 – Assessment Evidence
Formative Assessments "Do Now" Questions Class discussions Topic Discussions Questioning Lab Activities Exit Slips ***Summative Assessments*** Topic Quiz Unit Assessment ***Performance Task*** Watershed Basics Lab Project: Propose a solution to a problem our watershed/water body faces.

Stage 3 – Learning Plan
Project Wet Activities ● A Dynamic Watershed (pg 71) ● Topo Twister (pg 75) modify to use Google Earth as well as USGS Topographic Maps ● Downloads A Changed Land* (pg 125)

- The Nature of Impervious* (pg 131)
- Above & Below (pg 169; Above/surface water only)
- State of the Watershed (pg 81)
- A Look at the Bottom Dwellers – review only (pg. 151)
- State of the Watershed (pg 81)
- Ins, Outs, & In-betweens (pg 165)
- Sum of the Parts (pg. 283)
- Come to Consensus (pg 193)
- A Community Watershed (pg 199)

Unit Plan Title	Green Environmental (Grade 6)
Suggested Time Frame	40 lessons (one marking period)

Overview / Rationale
Students will learn to use data to construct arguments about local issues that are happening and try to design solutions to solve that problem. They will then evaluate the solution and see what improvements may need to be made.

Stage 1 – Desired Results

Established Goals:

New Jersey Student Learning Student-Science (2020)

MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

MS-ESS2-4 Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth’s systems.

Essential Questions:	**Enduring Understandings:**
● How can change in one part of an ecosystem affect other parts of the ecosystem? ● To what extent do humans impact the diversity and stability of ecosystems? ● How do matter and energy link organisms to each other and their environments?	● Organisms are linked to one another in an ecosystem by the flow of energy and the cycling of materials. ● Ecosystems change over time. ● Disruptions to any part of an ecosystem can lead to shifts in all of its populations. ● Human activities can alter the stability of ecosystems. ● Through education and proactive approaches, humans can help restore balances to an ecosystem.

Knowledge: *Students will know…*	**Skills:** *Students will be able to…*
● All populations living together (biotic factors) and the physical factors with which they interact (abiotic factors) compose an ecosystem. ● Ecosystems change over time. ● Organisms and populations are dependent on their environmental interactions both with other living things and with nonliving factors, any of which can limit their growth. ● Living organisms share common characteristics that distinguish them from non-living, dead, and dormant things. They grow, consume nutrients, exchange gases, respond to stimuli, reproduce, need water, eliminate waste, and are composed of cell(s). ● Humans can alter the biotic and abiotic factors within an ecosystem thereby creating changes to the overall system. The introduction of competing species, removal of natural habitat, alteration of native landscapes due to urban, industrial and agricultural activities, over-harvesting of species, alteration of waterways and removal of natural predators, etc., are actions that have a lasting impact on ecosystems. ● In all environments organisms with similar needs may compete with one another for resources including food, water, air, space and shelter. This competition results in natural population fluctuations. ● Organisms within an ecosystem may interact symbiotically through mutualism, parasitism, and commensalism. ● In most ecosystems, energy enters as sunlight and is transformed by producers into a biologically usable form of matter through photosynthesis. That matter and	● Ask questions for scientific inquiry. ● Define problems and design solutions. ● Plan and carry out investigations. ● Analyze and interpret data. ● Construct scientific explanations. ● Distinguish between biotic and abiotic factors and analyze the interaction between them in an ecosystem. ● Examine an assortment of plants and animals and use simple classification keys, based on observable features, to sort and group the organisms. ● Develop a model to describe the flow of energy (food web), identify the relationships among producers, consumers, and decomposers, and consider potential impacts to food webs. ● Describe species interactions that are both beneficial and detrimental (commensalism, mutualism, parasitism, competition, predation). ● Analyze and interpret data to provide evidence for the effects of resource availability and/or habitat change (i.e., space, food, water, disease) on organisms in an ecosystem. ● Investigate external conditions needed by a variety of organisms for survival (such as temperature, light, etc.), and predict how organisms may respond to changes in these external conditions. ● Research and analyze data on human population changes that have occurred over time in surrounding communities. ● Discuss reasons for changes in human population and explain how these changes have affected the biodiversity of local organisms and availability of natural resources in the given ecosystem (e.g., habitat loss, water quality, preservation/conservation efforts).

energy then passes from organism to organism through food webs. ● All organisms, including humans, are part of and depend on food webs. Food webs recycle matter continuously as organisms are decomposed after death to return food materials to the environment where it re-enters a food web. ● Top NJ forest problems: Loss of top predator, Change in habitats, Loss of open space, Habitat Fragmentation (Look at maps), Habitat Loss, Impacts of development, Loss of diversity (species and habitats), Invasive species (plants and insects), Endangered/Threatened Species, Pollution, Forest fires, Disease, Unmanaged recreation, Climate/weather ● Solving local environmental issues requires involvement of the entire community doing their part. In order to gain community support, the community must develop a culture of environmental awareness.	● Propose human interventions that can restore forest ecosystems to a more natural state

Interdisciplinary Connections
New Jersey Student Learning Standards-English Language Arts (2016): RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts. RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. Craft and Structure RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics. RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic. RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. Integration of Knowledge and Ideas RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). RST.6-8.8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video,

or multimedia sources with that gained from reading a text on the same topic.

New Jersey Student Learning Standards- Mathematics (2016):
6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
6.SP.B.4 Summarize numerical data sets in relation to their context.

New Jersey Students Learning Standards-Career Readiness,Life Literacies, and Key Skills (2020)
9.1.8.CR.2: Compare various ways to give back through strengths, passions, goals, and other personal factors.
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9.1.8.CDM.2: Demonstrate an understanding of the terminology associated with different types of credit (e.g., credit cards, installment loans, mortgages, lines of credit) and compare and calculate the interest rates associated with each.
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New Jersey Students Learning Standards-Computer Science and Design Thinking (2020)
8.2.8.ED.1 Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
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8.2.8.ITH.4 Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact.
8.2.8.ETW.2 Analyze the impact of modifying resources in a product or system (e.g., materials, energy, information, time, tools, people, capital).

Student Resources
Google Classroom Chromebook
Teacher Resources
Bridges to the Natural World New (Jersey Audubon Society) Signs of Animals Eating Student Sheet *Field and Laboratory Methods for General Ecology* , J. Brower 4th Edition (ISBN-13: 978-0697243584) *Petersons Ecology of Eastern Forests Field Guide,* John Kricher 1st Edition (ISBN-13: 978-0395479537) *Project Learning Tree Forest* (PLT), American Forest Foundation; 3rd edition (1995) Project Wild Ecological https://www.nj.gov/dep/seeds/projwild.htm Dig In Hands-on Soil Investigations https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/kthru6/?cid=nrcs142p2_054284 *Science Through Multiple Intelligences,* Robert Barkman (1999) *(*ISBN-13: 978-1569760963)

Stage 2 – Assessment Evidence
Formative Assessments "Do Now" Questions Classroom discussions Q&A Lab Activities Exit Slips ***Summative Assessments*** Quiz Unit Assessment

Stage 3 – Learning Plan
Project Learning Tree Forest (PLT) Traditional Forests: People of the Forest (PLT, pg 82) Then and Now (PLT, pg 174). Did You Notice? (PLT, pg 414) Discussion of what a forest is and how it functions: Trees grow and become the foundation of forest ecological processes that include energy flow from the sun through food webs, cycling of materials and water through living and nonliving parts of the forest, interrelationships between

living (predation, competition, mutualism, commensalism, parasitism) and nonliving parts of the forest (water, temperature, heat, light), and changes to the forest over years (succession).
Forest Interactions - Close Encounters of the Symbiotic Kind (Picture Perfect Science Lessons, pg 133)

Good Buddies (Project Wild, pg 104)
Declaration of Interdependence
The Eco-Connection (Bridges to the Natural World, pg 210)
Galls (Hands-On Nature, pg 150)
The Role of Galls (Science through Multiple Intelligences, pg 32)
Energy Flow – From Basement to Attic (Bridges to the Natural World, pg 129)
Living Links (Dig In, pg 73) or any food web activity
Cycling of Materials & Water - Animal Apartments (Dig In, pg 65)
The Fallen Log (PLT, pg 105)
Nature's Recyclers (PLT, pg 108)
Rotting Log Communities (Science through Multiple Intelligences, pg 36)
Fungal Partners (Science through Multiple Intelligences, pg 44)
Forest Floor Hands-On Nature, pg 73)
Rotting Logs Hands-On Nature, pg 80)
Great Growing Ground Stuff (Bridges to the Natural World, pg 192)
The Disappearing Leaf (Bridges to the Natural World, pg 200)
Water Wonders (PLT, pg 188)
Evapo-Transpiration activities
Succession: Nothing Succeeds Like Succession (PLT, pg 345) Planet Diversity (PLT pg 45)
Invasive Species (PLT pg 59)
Forest Consequences (PLT pg 138)
Loving It Too Much (PLT pg 147)
We Can Work It Out (PLT pg 241)
Living With Fire (PLT pg 350)
Life on the Edge (PLT pg 382)
Threatened and Endangered Species of New Jersey (Bridges)
Decomposition Videos as Do Nows (explain what is happening)
Global Cooking- Cookie Mining (natural resources impact on environment) Seed Bombs
Collecting Seeds Winter Ecology Hike Field Botany Long Term Project: Project Budburst Field

Trip: Local park to ID organisms and problems, collect seeds of native plants, or help a local organization with their project (ex: Environmental and Shade Tree Commission- Rain Garden at Jumping Brook Baseball Fields).
Pre-Activity – reading and discussion of sections of "Ecology of Eastern Forests" pg 20 – 21 on "A Forest's Age" Potential Field Trip Activities – Invertebrate Collection & Identification (both decomposers & herbivores), Survey of Fungal Communities, Abiotic Factors Measurement (temperature – soil).

Unit Plan Title	Blue Environmental (Grade 7)
Suggested Time Frame	40 Lessons (one marking period)

Overview / Rationale
This group of students will look at the world crisis on water and how there is a small amount of freshwater that is available to drink around the world and how not everyone has equal opportunity to that water. The students will also look at how water is treated in different areas so that it can be safe to drink.

Stage 1 – Desired Results

Established Goals:

New Jersey Student Learning Standards in Science (2020)

MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]

MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. [Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.]

MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Essential Questions:	**Enduring Understandings:**
● What can we do to benefit the health of humans and other organisms? ● How can change in one part of an ecosystem affect other parts of the ecosystem? ● How is water purified? ● Who is in charge of making sure that the water is safe to drink? ● What tools are used to check the health of the water?	● The life processes of organisms are affected by their interactions with each other and their environment, and may be altered by human manipulation. ● Organisms and their environments are interconnected. Changes in one part of the system will affect other parts of the system. ● Technological advances and improvements in hygiene have helped in the prevention and treatment of illness. ● The environment may contain dangerous levels of substances in the water that are harmful to organisms. Careful monitoring of these is important for healthy life processes.
Knowledge: *Students will know…* ● Water from some natural sources is unfit to drink and requires the use of specialized technology to analyze and purify it. ● A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. ● Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. ● Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. ● Human activities (e.g., the introduction of competing species, removal of natural habitat, alteration of native landscapes due to urban, industrial and agricultural activities, over-harvesting	**Skills:** *Students will be able to…* ● Ask questions for scientific inquiry. ● Define problems and design solutions as engineers. ● Plan and carry out investigations. ● Analyze and interpret data. ● Construct scientific explanations. ● Develop and use models and prototypes. ● Present engineering solutions and scientific data to a public audience. ● Consider the needs of various stakeholders who seek solutions to specific problems. ● Use various indicators (pH, turbidity, nitrates, phosphates, salinity, etc.) to establish the health and potential potability of bodies of water. ● Explain how sanitation measures such as sewers, landfills, and water treatment are important in controlling the spread of organisms that contaminate water and cause disease. ● Research problems in developing nations.

of species, alteration of waterways, removal of natural predators, greenhouse gases from burning fossil fuels/ global warming, pollution, etc.) have altered biotic and abiotic factors within ecosystems, sometimes damaging them. ● Changes to environments can have different impacts for different living things. ● Humans can have both negative and positive impacts on the health of ecosystems. ● Humans are responsible for making decisions to protect and maintain the health of ecosystems.	● Research various neglected diseases relating to water contamination. ● Analyze different kinds of water filtration projects that have been employed around the world. ● Compare and contrast different filtration methods (physical, chemical, biological). ● Research and report the social issues that inform the problem and solution. ● Define turbidity and articulate factors that affect the turbidity of water. ● Articulate ways in which turbidity can affect human health and the health of aquatic ecosystems. ● Investigate, through the use of models, how water acts as a solvent and as it passes through the water cycle it dissolves minerals, gases, and pollutants and carries them to surface water and groundwater supplies.

Interdisciplinary Connections
New Jersey Student Learning Standards- English Language Arts (2016): RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts. RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. Craft and Structure RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics. RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic. RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. Integration of Knowledge and Ideas RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). RST.6-8.8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

New Jersey Student Learning Standards -Mathematics (2016):
6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. 6.SP.B.4 Summarize numerical data sets in relation to their context.

New Jersey Student Learning Standards - Career Readiness,Life Literacies, and Key Skills (2020)
9.1.8.CR.2: Compare various ways to give back through strengths, passions, goals, and other personal factors.
9.1.8.CR.3: Relate the importance of consumer, business, and government responsibility to the economy and personal finance.
9.1.8.CDM.2: Demonstrate an understanding of the terminology associated with different types of credit (e.g., credit cards, installment loans, mortgages, lines of credit) and compare and calculate the interest rates associated with each.
9.1.8.CR.4: Examine the implications of legal and ethical behaviors when making financial decisions.

New Jersey Student Learning Standards - Computer Science and Design Thinking (2020)
8.2.8.ED.1 Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
8.2.8.ED.3 Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).
8.2.8.ITH.4 Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact.
8.2.8.ETW.2 Analyze the impact of modifying resources in a product or system (e.g., materials, energy, information, time, tools, people, capital).

Student Resources
Chromebook Google Classroom

Teacher Resources
The Aquaponic Source http://theaquaponicsource.com/ The Native Plant Society of NJ **https://npsnj.org/** The Native Plant Gallery http://www.npsnj.org/pages/nativeplants_Native_Plant_Gallery.html Project Learning Tree Activity book Project Wild Activity book

Student Resources
What Lies Upstream Documentary (2018) Director: Cullen Hoback Chromebook Google Classroom
Teacher Resources
Project Learning Tree Forest Literacy *https://www.plt.org/wp-content/uploads/pdf/PLT_Forest-Literacy-Framework.pdf* Project Wild Ecological Dig In Hands-on Soil Investigations Science Through Multiple Intelligences

Stage 2 – Assessment Evidence
Pre-Assessment: Survey background knowledge about water in the community How do you think water is treated? What are our drinking water sources? ***Formative Assessments*** Various "Do Now" Questions Class discussions-observations of students' responses to readdress topics or concept to be readdressed Driving Question Board - students generate questions to answer in unit. Lab Activities Exit Slips

Summative Assessments

Water Quality Lab

Filter Challenge Performance Task: How can we help a specific group of people increase the safety (drinkability, usability) of their water?

Project

How can we help a specific group of people increase the safety (drinkability, usability) of their water? Directions to take this: Engineer a design to be produced and sold. Consider cost, materials, times, etc.

Stage 3 – Learning Plan
Design it Clean: Water Bottle Challenge Just Passing Through (pg 166) Project Wet Who Dirtied the Water? https://ag.umass.edu/sites/ag.umass.edu/files/news/pdf/who_dirtied_the_water.pdf Water Conservation Game https://ocde.us/ito/Documents/WaterConservationGame.pdf Waterful Foods https://www.swfwmd.state.fl.us/sites/default/files/medias/documents/Waterful%20Foods.pdf What is greywater, and can it solve the global water crisis? https://home.howstuffworks.com/green-living/gray-water.htm How Water Towers Work https://people.howstuffworks.com/water.htm Aquifers and Recharge Areas https://www.gvsu.edu/cms4/asset/E1327343-09F0-03FF-AA9032F47AD1EB9C/aquifers_recharge.pdf

Unit Plan Title	Green Environmental (Grade 7)
Suggested Time Frame	40 lessons (one marking period)

Overview / Rationale
Students will use evidence to support how the population can grow and change. They will study population growth, reproduction, and population dynamics. They will also see how the consumption of resources by humans can change the balance of an ecosystem.

Stage 1 – Desired Results

Established Goals:

New Jersey Student Learning Standards in Science (2020)

MS-LS1-4 Use arguments based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. [Clarification Statement: Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds, and creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury.]

MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. [Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds.] [Assessment Boundary: Assessment does not include genetic mechanisms, gene regulation, or biochemical processes.]

MS-LS1-6 Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. [Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.] [Assessment Boundary: Assessment does not include the biochemical mechanisms of photosynthesis.]

MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. [Clarification Statement: Emphasis

is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]

MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]

MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services. [Clarification Statement: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations.]

MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. [Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.]

MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused climate change over the past century. [Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gasses such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]

Essential Questions:	**Enduring Understandings:**
● What can we do to benefit the health of humans and other organisms? ● How does the understanding and manipulation of genetics, reproduction, development and evolution affect the quality of human life? ● How can change in one part of an ecosystem affect change in other parts of the ecosystem? ● To what extent do humans impact the diversity and stability of ecosystems?	● The desire to protect biodiversity often conflicts with other human interests. ● Changes to an ecosystem affect populations. ● Increases in population impact the Earth's systems. ● Human activities has caused climate change.

Knowledge: *Students will know…*	**Skills:** *Students will be able to…*
● Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things (biotic) and with nonliving factors (abiotic). ● In most ecosystems, organisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. That matter and energy then passes from organism to organism through food webs. ● Growth of organisms and population increases are limited by access to resources (food, water, oxygen, etc.). ● Reproduction is a characteristic of all living systems and is essential to the continuation of every species. ● Some organisms reproduce asexually involving one parent. Asexual reproduction results in offspring that are genetically identical to the parent organism. This process is advantageous in maintaining the genetic makeup of organisms that are successful in a specific environment. Some organisms reproduce sexually involving two parents. Sexual reproduction results in offspring that have greater genetic diversity than those resulting from asexual reproduction. One-half of the offspring's genetic information comes from the "male" parent and one-half comes from the "female" parent. These genetic differences help to ensure the survival of offspring in varied environments. ● Organisms have different reproductive strategies to ensure their offspring's survival. Some organisms produce many offspring and provide little parental care. Other organisms produce	● Summarize the basic process in which energy from sunlight is used to make sugars from carbon dioxide and water (photosynthesis). Indicate that this food can be used immediately, stored for later use, or used by other organisms. ● Research external conditions needed by a variety of organisms for survival (e.g., temperature, turbidity, pH, salinity, and amount of dissolved oxygen, phosphates, nitrates, etc.). ● Investigate and discuss how short-term physiological changes of an organism (e.g., skin tanning, muscle development, formation of calluses) differ from long-term evolutionary adaptations (e.g., white coloration of polar bears, seed formation in plants) that occur in populations of organisms over generations. (conduct their own experiment with the WFPs) ● Design an experiment to investigate how organisms fulfill basic needs (i.e., food, shelter, air, space, light/dark, and water) in a competitive environment. Relate how competition for resources can determine survival. ● Observe a variety of organisms and explain how a specific trait could increase an organism's chances of survival. ● Recognize that reproduction is a process that occurs in all living systems and is essential to the continuation of the species as such they will evaluate models or diagrams to identify the structures of a flowering plant that produce eggs and sperm and explain that plants, as well as, animals can reproduce sexually. ● Compare and contrast asexual and sexual reproduction in terms of potential

few offspring and invest much time and energy in care of their offspring. ● Selective breeding is used to cultivate plants and domesticated animals with desirable traits. ● Natural selection is the process by which some individuals with certain traits are more likely to survive and produce greater numbers of offspring than other organisms of the same species. Competition for resources and mates and conditions in the environment can affect which individuals survive, reproduce and pass their traits on to future generations. ● The functioning, health, and growth of organisms are influenced by many factors, including both genetic and environmental (i.e., heredity, diet, lifestyle, bacteria, viruses, parasites, etc.). ● Human activities (e.g., the introduction of competing species, removal of natural habitat, alteration of native landscapes due to urban, industrial and agricultural activities, over-harvesting of species, alteration of waterways, removal of natural predators, greenhouse gasses from burning fossil fuels/ global warming, etc.) have altered biotic and abiotic factors within ecosystems, sometimes damaging them. Changes to environments can have different impacts for different living things.	variation and adaptation to a static or changing environment. ● Discuss the advantages and disadvantages of different reproductive strategies in terms of energy expenditure per offspring and survival rates of that offspring. ● Compare and contrast different methods of growing plants (traditional soil-based, hydroponics, aquaponics, etc.)

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RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. Integration of Knowledge and Ideas
RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
RST.6-8.8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

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6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
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9.1.8.CR.2: Compare various ways to give back through strengths, passions, goals, and other personal factors.
9.1.8.CR.3: Relate the importance of consumer, business, and government responsibility to the economy and personal finance.
9.1.8.CDM.2: Demonstrate an understanding of the terminology associated with different types of credit (e.g., credit cards, installment loans, mortgages, lines of credit) and compare and calculate the interest rates associated with each.
9.1.8.CR.4: Examine the implications of legal and ethical behaviors when making financial decisions.

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8.2.8.ED.1 Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
8.2.8.ED.3 Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).
8.2.8.ITH.4 Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact.

8.2.8.ETW.2 Analyze the impact of modifying resources in a product or system (e.g., materials, energy, information, time, tools, people, capital).

Student Resources
ChromeBook Google Classroom
Teacher Resources
The Aquaponic Source http://theaquaponicsource.com/ The Native Plant Society of NJ http://www.npsnj.org/pages/nativeplants_Native_Plant_Gallery.html Project Learning Tree Activity book Project Wild Activity book

Stage 2 – Assessment Evidence
Formative Assessments "Do Now" Questions Classroom discussions Q&A Lab Activities Exit Slips ***Summative Assessments*** Quiz Unit Assessment

Stage 3 – Learning Plan
Engineer a design to be produced and sold. How can we help a specific group of people with their "green" problems? (Examples: supplies for crops, apiary for honey farm, equipment for harvesting, organic fertilizer, etc.). Consider cost, materials, times, etc. Energy For Life Wisconsin Fast Plants Student Experiments (self-driven, who can make the hairiest?, selective breeding/artificial selection, etc.) Aquaponics Experiments Lights Out Plant Biology, Botany and Agriculture Experiments Transpiration Experiments What is Stomata (Stomata Experiment) Seed Harvesting

Unit Plan Title	Blue Environmental (Grade 8)
Suggested Time Frame	40 Lessons (one marking period)

Overview / Rationale
Students are going to develop a plan on how to study a local population of animals using different tracking methods to follow the animals as they travel through an ecosystem. they will use other real tracking data to show how their plan can be conducted in the real world situation.

Stage 1 – Desired Results

Established Goals:
New Jersey Student Learning Standards in Science (2020)

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. [Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]

MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. [Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.

MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]

MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. [Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.] [Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.] • MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]

Essential Questions:	**Enduring Understandings:**
● How and why do organisms interact with their environment? ● How can interactions between organisms in one part of an ecosystem affect interactions in other parts of the ecosystem? ● Why are changes in matter accompanied by changes in energy? ● How do we track animals? ● How can we estimate the total population of a species in an area?	● Energy flows and matter cycles within and among Earth's systems ● Human activities have altered the biosphere, sometimes damaging it, although changes to environments can have different impacts for different living things. ● Organisms and populations are dependent on their environmental interactions both with other living things and with nonliving factors, any of which can limit their growth. ● Ecosystem characteristics vary over time. Disruptions to any part of an ecosystem can lead to shifts in all of its populations. ● Changes in biodiversity can influence humans' resources and ecosystem services they rely on.
Knowledge: *Students will know…* ● Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. ● Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and/or technologies involved are engineered otherwise. ● Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. ● In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other	**Skills:** *Students will be able to…* ● Survey the diversity of organisms in a local or model ecosystem. Recognizing that a population consists of all individuals of a species that occur together at a given place and time, describe how to estimate and then calculate the size of a large population of a variety of organisms. Chart the diversity of the organisms in the ecosystem. ● Categorize populations of organisms according to the roles (producers, consumers, and decomposers) they play in an ecosystem. ● Describe and explain how factors (i.e., space, food, water, disease) limit the number of organisms an ecosystem can support. ● Construct a data table or line graph to show population changes of a selected species over time. Describe the population changes portrayed by the graph.

for limited resources, access to which consequently constrains their growth and reproduction. ● Growth of organisms and population increases are limited by access to resources. ● Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. ● Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. ● Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. ● Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health	● Observe graphs or data tables showing both the population growth of a species and the consequences of resource depletion on the population. Analyze the data and explain the effect that may occur from exponential growth of a population (given finite resources). ● Construct food webs and identify the relationships among producers, consumers, and decomposers. ● Design food webs and trace the flow of matter and energy (beginning with the Sun) through the food web. ● Research and analyze data on human population changes that have occurred in a specific ecosystem. Discuss reasons for changes in human population and explain how these changes have affected the biodiversity of local organisms and availability of natural resources in the given ecosystem (e.g., habitat loss, water quality, preservation/conservation efforts). ● Identify ways in which invasive species can disrupt the balance of ecosystems (i.e., competition for resources including habitat and/or food). Research and report on an invasive species, indicating how this species has altered the ecosystem.

Interdisciplinary Connections
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Student Resources
ChromeBook Google Classroom
Teacher Resources
Project Wet Activity Book Ocean Tracks http://oceantracks.org/getting-started tracking activities curriculum New Jersey Sea Grant Consortium (NJSGC) https://njseagrant.org/

Stage 2 – Assessment Evidence
Formative Assessments: Do Nows Q&A Topic Discussions Lab Activities Exit Slips ***Summative Assessments*:** Quiz Unit Assessment ***Performance Task:*** Pick a marine or aquatic organism negatively affected (threatened, endangered, etc.) in your local ecosystem and raise awareness or propose a solution. Tagging Tracking activity

Stage 3 – Learning Plan
Web of life (NJSGC) Charting the Tides (NJSGC) Tidal Weirdness (Scijinks)

Estuarine Currents (NJSGC)
Marbef.org student research marine habitat
Marine Debris Shoreline Survey (NOAA)
Trash Lasts What is pH?
Atmospheric CO2 Can Produce Ocean Acidification (EPOCA)
Modeling Beach Erosion (NJSGC)
Great Pacific Garbage Patch Plankton (races, build, ID under microscope)
Buoyancy (plankton, ROVs)
Camouflage (countershading, clear as young- advantages, camo fish challenge)
Salt Marsh Players (pg 99)

Field Trip: Shark River or Sandy Hook

Unit Plan Title	Green Environmental (Grade 8)
Suggested Time Frame	40 Lessons (one marking period)

Overview / Rationale
Students will use data to support an argument that human activities are changing ecosystems all around the world. Students will use data to show how the ecosystems are changing and make predictions to future impacts if current trends stay true.

Stage 1 – Desired Results

Established Goals:

New Jersey Student Learning Standards in Science (2020)

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. [Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]

MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. [Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.]

MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]

MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. [Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.] [Assessment Boundary: Assessment does not include the use of chemical reactions to describe the processes.] • MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. [Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.]

Essential Questions:	**Enduring Understandings:**
● How and why do organisms interact with their environment? ● How can interactions between organisms in one part of an ecosystem affect interactions in other parts of the ecosystem? ● What is causing global warming?	● Energy flows and matter cycles within and among Earth's systems ● Human activities have altered the biosphere, sometimes damaging it, although changes to 38 environments can have different impacts for different living things. ● Organisms and populations are dependent on their environmental interactions both with other living things and with nonliving factors, any of which can limit their growth. ● Ecosystem characteristics vary over time. Disruptions to any part of an ecosystem can lead to shifts in all of its populations. ● Changes in biodiversity can influence humans' resources and ecosystem services they rely on.
Knowledge: *Students will know…* ● Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. ● Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and/or technologies involved are engineered otherwise. ● Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. ● In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which	**Skills:** *Students will be able to…* ● Survey the diversity of organisms in a local or model ecosystem. Recognizing that a population consists of all individuals of a species that occur together at a given place and time, describe how to estimate and then calculate the size of a large population of a variety of organisms. Chart the diversity of the organisms in the ecosystem. ● Categorize populations of organisms according to the roles (producers, consumers, and decomposers) they play in an ecosystem. ● Describe and explain how factors (i.e., space, food, water, disease) limit the number of organisms an ecosystem can support. ● Construct a data table or line graph to show population changes of a selected species over time. Describe the population changes portrayed by the graph.

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ChromeBook Google Classroom Data to the Rescue binder
Teacher Resources
Project WET Activity book Data to the Rescue Teacher slides

Stage 2 – Assessment Evidence
Formative Assessments "Do Now" Questions Classroom discussions Q&A Lab Activities Exit Slips ***Summative Assessments*** Quiz Unit Assessment

Stage 3 – Learning Plan
Forest Ecosystem Analysis: Examine energy flow and food webs, water and material cycling, population controls through ecosystem connections that keep everything in check, and biodiversity that allows for dynamic change. Planet Diversity (PLT pg 45) Invasive Species (PLT pg 59) Forest Consequences (PLT pg 138)

Loving It Too Much (PLT pg 147) We Can Work It Out (PLT pg 241) Living With Fire (PLT pg 350) Life on the Edge (PLT pg 382) Threatened and Endangered Species of New Jersey (Bridges) Field Trip: Forest location to collect data. Data Jam for penguin program (Rytger's University)

Accommodations and Modifications:
Below please find a list of suggestions for accommodations and modifications to meet the diverse needs of our students. Teachers should consider this a resource and understand that they are not limited to the recommendations included below.

An accommodation changes HOW a student learns; the change needed does not alter the grade-level standard. A modification changes WHAT a student learns; the change alters the grade-level expectation.

***Special Education and 504 Plans**:All modifications and accommodations must be specific to each individual child's IEP (Individualized Educational Plan) or 504 Plan. All students with 504 plans should be provided the necessary tools to be successful in the course.*

- Pre-teach or preview vocabulary
- Repeat or reword directions
- Have students repeat directions
- Use of small group instruction
- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments
- Repetition and time for additional practice
- Model skills/techniques to be mastered
- Extended time to complete task/assignment/work
- Provide a copy of class notes Strategic seating (with a purpose – e.g. less distraction)
- Flexible seating
- Repetition and additional practice
- Use of manipulatives
- Use of assistive technology (as appropriate)
- Assign a peer buddy
- Emphasize key words or critical information by highlighting
- Use of graphic organizers
- Scaffold with prompts for sentence starters
- Check for understanding with more frequency
- Provide oral reminders and check student work during independent practice
- Chunk the assignment - broken up into smaller units, work submitted in phases Encourage student to proofread assignments and tests
- Provide regular home/school communication
- Teacher checks student planner
- Provide student with clear expectations in writing and grading criteria for assignments (rubrics)

Testing Accommodations:
Students should receive all testing accommodations for Benchmark assessments that they receive for State testing.

- Setting: Alternate setting for assessments, small groups, screens to block distractions
- Presentation: large print, test readers, use of audio, fewer questions on each page

- Response: answer verbally, use large block answer sheet, speech-to-text dictation, accept short answers
- Allow for retakes
- Provide study guides
- Use of reference aids such as glossary, multiplication tables, calculator
- Alternate ways to evaluate (projects or oral presentations instead of written tests)
- Open-book or open-note tests

English Language Learners:
All modifications and accommodations should be specific to each individual child's LEP level as determined by the WIDA screening or ACCESS, utilizing the WIDA Can Do Descriptors.

- Pre-teach or preview vocabulary
- Repeat or reword directions
- Have students repeat directions
- Use of small group instruction
- Scaffold language based on their Can Do Descriptors
- Alter materials and requirements according to Can Do Descriptors
- Adjust number of paragraphs or length of writing according to their Can Do Descriptor
- TPR (Total Physical Response-Sheltered Instruction strategy) Demonstrate concepts through multi-sensory forms such as with body language, intonation
- Pair visual prompts with verbal presentations
- Repetition and additional practice
- Model skills and techniques to be mastered
- Native Language translation (peer, assistive technology, bilingual dictionary)
- Emphasize key words or critical information by highlighting
- Use of graphic organizers
- Scaffold with prompts for sentence starters
- Check for understanding with more frequency
- Use of self-assessment rubrics Increase one-on-one conferencing; frequent check ins
- Use study guide to organize materials
- Make vocabulary words available in a student created vocabulary notebook, vocabulary bank, Word Wall, or vocabulary ring
- Extended time
- Select text complexity and tiered vocabulary according to Can Do Descriptors
- Projects completed individually or with partners
- Use an online dictionary that includes images for words.

Students at Risk of Failure:

- Use of self-assessment rubrics for check-in
- Pair visual prompts with verbal presentations
- Ask students to restate information and/or directions
- Opportunity for repetition and additional practice

- Model skills/techniques to be mastered
- Extended time
- Provide copy of class notes
- Strategic seating with a purpose
- Provide students opportunity to make corrections and/or explain their answers
- Support organizational skills

High Achieving:

- Allow for student choice from a menu of differentiated outcomes; choices grouped by complexity of thinking skills; variety of options enable students to work in the mode that most interests them
- Allow students to pursue independent projects based on their individual interests
- Provide enrichment activities that include more complex material
- Allow opportunities for peer collaboration and team-teaching
- Set individual goals
- Conduct research and provide presentation of appropriate topics

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