

EDUCATION PROGRAMS

6TH GRADE - 12TH GRADE

- 2023 / 2024 -



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ABOUT US

Lucas Soil & Water Conservation District is a political subdivision of the State of Ohio and receives voluntary funding from the Lucas County Commissioners, Local Cities/Townships, and the State of Ohio. Our mission is to provide leadership for conservation of our soil, water, and other resources through education, information, and technical assistance.



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Introduction to Lucas SWCD Education Programs

Dear Educator,

The Lucas Soil & Water Conservation District (SWCD) has a variety of educational presentations and activities available to be presented in your classroom, free of charge, which align with State Board of Education Standards. These are generally science related, however, we do offer programs that incorporate math, social studies/civics, and language arts standards.

Please note page 3 is a list of all presentations offered at the time this book is put together. NOTE: This booklet contains programs for 6th-12th grade. Please see our PreK- 5th grade booklet also posted on our website. Program descriptions along with estimated time of presentations, can be found throughout this booklet. Presentations are categorized by grade level, however, these are suggestions based on standards for the specific grade level. Pages 4-5 contain a highlight of programs for this year that can fit with multiple grade levels. All presentations can be adapted to your specific grade level and meet the needs of your students.

To schedule a classroom program, please contact Patrick Troyer, Education Specialist at Lucas SWCD, via phone or email. **Mondays will be my office days with programs being offered Tuesday through Friday. Scheduling is done on a first come, first serve basis.**

If there is a specific topic area that you wish to have presented that is not listed in this book, please contact Patrick to see if and how we can develop a program or activity to fit your needs.

- PATRICK TROYER -

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*If there is a topic you would like covered that is not listed, let me know and we can see where it fits! *

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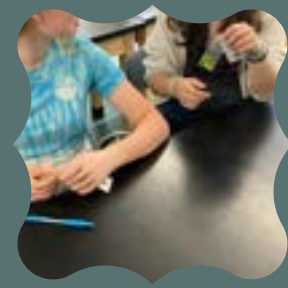
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ENVIRONMENTAL SCIENCE PROGRAMS



4R LAKE: DOING YOUR PART

We all enjoy fresh, clean water, not only for nourishment, but also for recreation and many other uses in our daily lives. This program will help remind us of the simple things that we can do to help keep our waterways clean and healthy for the safe enjoyment of humans and animals. Students will start out with a small baggie with gel to represent a “clean lake”. Over the course of the program, we will see how grass clippings, fertilizer, pet wastes, and soap/car chemicals make their way to the lake and see how these pollutants along with wind and sunlight affect the quality of our water. How is the water quality now? Students will be able to take their “lake” home and wear it as a necklace with a card that has some reminders on how we all can work together to keep our waterways clean and healthy.

Academic Standard:

7.ESS.1 The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.

Geography Strand-Human Systems #16: The availability of natural resources contributed to the geographic and economic expansion of the United States, sometimes resulting in unintended environmental consequences.



Estimated Time: 30 Minutes

SUM OF THE PARTS (NON-POINT SOURCE POLLUTION ENVIROSCAPE)

Students see first-hand how everyone plays their individual part in the health of our waterways through the Non-Point Source EnviroSCOPE Model. Different pollutants such as manure, soil, fertilizer, pesticides, motor oil, and many more are introduced to the environment. Students will learn about water movement through a watershed and see how this pollution spreads when a big rainstorm comes and pollutes the rivers and streams to become runoff. This model will demonstrate the differences between point and nonpoint pollution, see examples of each, and learn what BMPs (Best Management Practices) can be utilized to curb the impacts of water pollution. We will also discuss various environmental laws such as the Clean Water Act.

Academic Standard:

7.ESS.1 The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.

Geography Strand-Human Systems #16: The availability of natural resources contributed to the geographic and economic expansion of the United States, sometimes resulting in unintended environmental consequences.

Estimated Time: 35 Minutes

ENVIROSCAPE MODEL: HAZARDOUS WASTE DISPOSAL & CLEANUP

When thinking about hazardous waste, what comes to mind? What are hazardous wastes and why do we use them? We use them everyday including: fuels, solvents, fertilizer, and pesticides. Thanks to funds from an Ohio EPA Grant, Lucas SWCD has a Hazardous Prevention and Cleanup EnviroSCOPE that will help answer these and many additional questions by helping to visualize this very important issue. This demonstration model will help illustrate issues arising from improper discharge/disposal, or accidental spills along with methods to clean up and prevent spillage of hazardous waste. Sources that are discussed include underground storage tanks, illegal dumping, household/commercial practices.

Academic Standard:

7.ESS.1 The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.

Geography Strand-Human Systems #16: The availability of natural resources contributed to the geographic and economic expansion of the United States, sometimes resulting in unintended environmental consequences.



Estimated Time: 40 Minutes



ENVIRONMENTAL SCIENCE PROGRAMS



ENVIROSCAPE MODEL: WATER TREATMENT WONDERS

Do you know where your water comes from and the processes involved with treating it? Follow along as we highlight the process of how the water we use on a daily basis is drawn from its source such as a lake or river to the water treatment plant where it is treated and then stored in either a reservoir or water tower with the final step being distribution of clean water to our homes.

Do those who live in the country have their water cleaned in the same way? Not necessarily! If you live in the country, your water is obtained and cleaned in a different manner. This program will feature our Drinking Water Enviroscape Model that will highlight the processes involved with water treatment before it reaches our homes and how the wastewater is cleaned at the Wastewater Treatment Plant before it is released back into the environment.

Academic Standard:

7.ESS.1 The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.

Geography Strand-Human Systems #16: The availability of natural resources contributed to the geographic and economic expansion of the United States, sometimes resulting in unintended environmental consequences.



Estimated Time: 30 Minutes

WETLAND MARVELS (ENVIROSCAPE MODEL)

Students will gain an understanding on the characteristics of wetlands as well as learn about and appreciate the vital functions wetlands serve to the environment for both humans and animals. To illustrate the services wetlands provide, students will view a demonstration of the Enviroscape Wetlands Model where students will learn about the services wetlands provide, the various types of wetlands that exist, and the differences in the health of the environment with and without wetlands. We will discuss wetland restoration and mitigation along with be able to identify what qualifies as a wetland. By the end of this program, students will be able to describe major changes in Ohio's environments over time and the organisms supported in each while learning about many of the wetlands near them!



Academic Standard:

7.ESS.1 The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere.

Geography Strand-Human Systems #16: The availability of natural resources contributed to the geographic and economic expansion of the United States, sometimes resulting in unintended environmental consequences.

Estimated Time: 40 Minutes

MIGHTY MACROINVERTEBRATES

In this program, we will cover the basics of macroinvertebrates such as their life cycle, classification, and the importance they serve when determining water quality. This program will discuss how macroinvertebrates are classified by how they eat their food and their tolerance to water pollution as an indicator species.

This program will include a "lab practical" style activity with students rotating between two stations. In station 1, Identification skills will be put to the test, as students will work together in groups to identify macroinvertebrate specimen samples drawing on prior knowledge and using a dichotomous key. For station two, students will examine a mock stream with macroinvertebrate animal cards where they will also view a demonstration of the tools used to sample for macroinvertebrates and then sample for macros themselves and keeping track of what macros they find, Data collected during this activity will be used to calculate and then develop a water quality rating.



Additional Option: In the field stream sampling and identification can also be done as part of this program if it is feasible for your group and there is an accessible site either at your school or you have transportation to another stream site. Otherwise, water samples will be collected prior to the program and brought into the classroom for the identification exercise.

Estimated Time: 40 minutes

ENVIRONMENTAL SCIENCE PROGRAMS



JUST PASSING THROUGH

Students will learn about erosion and water movement in a completely new way through this activity! They will get an overview of what erosion is, why it is bad, and how plants can help prevent it. Students will have the opportunity to investigate how vegetation influences the movement of water over land surfaces and learn how to determine the best practices that can be used to prevent it.



Students will demonstrate the path of water flowing through a site with students broken up into two groups, "raindrops" or "plants". The "raindrops" will meander towards the stream picking up sediment (poker chips) along the way. When the "raindrops" run into a "plant" they will circle the plant five times and drop one piece of sediment with each turn. The goal is to see how much sediment (poker chips) the water droplets collect once they reach the stream as well as how plants help prevent pollution, nutrients, and sediment from reaching streams.

Academic Standard:

Geography Strand-Human Systems #16: The availability of natural resources contributed to the geographic and economic expansion of the United States, sometimes resulting in unintended environmental consequences.

7.LS.2 In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

Estimated Time: 30 Minutes

INVADERS!

What would your reaction be if someone came to your house, took over, and didn't want to leave? This program will introduce invasive species (both plants and animals) looking at what they are, how they are transported between ecosystems, and the damage they can present to the native species that have been in that ecosystem all their lives. We will examine how introduction of invasive species can often be accidental but there are instances where it is intentional such as the Ohio Department of Natural Resources (ODNR) stocking a lake with fish to create better fishing opportunities. In this activity, students will participate in a full-body movement "musical chairs-style" game where they will simulate competition for habitat and resources.



Academic Standard:

Geography Strand-Human Systems #16: The availability of natural resources contributed to the geographic and economic expansion of the United States, sometimes resulting in unintended environmental consequences.

7.LS.2 In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

Estimated Time: 35 Minutes

RENEWABLE OR NOT

Everything we do on a daily basis from the paper we write on, the cars we drive, and the food we eat, involves the use of a natural resource. The question often arises about which resources are renewable and which are non-renewable. Standards of living for people all over the world heavily depend on environmental health, availability and use/distribution of natural resources and it is management and conservation of these resources that will allow humanity to maintain and extend the productivity of natural resources. Our first activity will focus on our societal uses/management of renewable and nonrenewable resources to comprehend what makes a renewable resource sustainable. The final activity will have students take cards with everyday items and deciding upon the most sustainable use such as recycling, composting, reuse, and many more and placing their cards in the correct bin for each category.



Academic Standard:

Geography Strand-Human Systems #16: The availability of natural resources contributed to the geographic and economic expansion of the United States, sometimes resulting in unintended environmental consequences.

7.LS.2 In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

Estimated Time: 35 Minutes



AGRICULTURE & FOOD SYSTEMS PROGRAMS

CAREERS IN CONSERVATION



Did you know that the world population is estimated to be 9.5 billion people by the year 2050? Do you want to be part of the solution to feed these 9.5 billion people while working to protect our natural resources? Then a career in the agricultural industry is for you! Agriculture can be found in so many places in Lucas County and around Ohio and with that comes a wide variety of valuable and rewarding careers. In this program, students view a glimpse of the careers in agriculture and conservation that are available to them whether it might be the Soil & Water Conservation District, Ohio Department of Agriculture, United States Department of Agriculture, parks district, or research, there are plenty of rewarding careers to be found! Follow along with us as we give a glimpse at our work at the Lucas Soil & Water Conservation District and the career possibilities available in the Soil and Water world as well as throughout the agricultural industry.

Estimated Time: 30 Minutes

FARM TO FORK

Did you know that one in six members of the workforce in the United States are employed in the food chain, from farm fields to food service? This program explores how the food we eat each day including plant, animal, and seafood products are grown, harvested, processed, and then distributed. Students will look at traditional industrial practices/growing methods, explore sustainable alternatives, all while taking into consideration the impact both have on not only human health but environmental health. To understand how food and many other products get to our table, we need to understand the source of the goods. In this activity, students will learn that agriculture provides nearly all of the products we rely on in any given day by participating in a relay where they match an everyday item with its "source." After learning about the "source", students conduct an activity to learn the sequence of production to discover the resources required and the variety of careers involved to take a raw food from the farm to the consumer.



Academic Standard:

Geography Strand-Human Systems #16: The availability of natural resources contributed to the geographic and economic expansion of the United States, sometimes resulting in unintended environmental consequences.

7.LS.2 In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

6.ESS.4 Soil is unconsolidated material that contains nutrient matter and weathered rock.

6.ESS.5 Rocks, mineral and soils have common and practical uses.

Estimated Time: 30 Minutes

DIG THOSE CHIPS

This program combines Social Studies and Science concepts into one presentation. Emphasis will be put on the fact that soil forms the very foundation of our economy as many industries such as agriculture, forestry, and clothing are heavily dependent on a healthy soil to have resources to bring their products to the market. This program also covers the basics of how a market works and other terms such as supply/demand, competition, advertising, producer, consumer, and market. The students will learn about how potatoes are grown from planting to harvesting to consuming potato chips. They will conduct their own taste test of potato chips and think like a consumer deciding which chip to buy based on price, product quality, brand, and advertising.

Academic Standard:

Geography Strand-Human Systems #16: The availability of natural resources contributed to the geographic and economic expansion of the United States, sometimes resulting in unintended environmental consequences.

7.LS.2 In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

6.ESS.4 Soil is unconsolidated material that contains nutrient matter and weathered rock.

6.ESS.5 Rocks, mineral and soils have common and practical uses.



Estimated Time: 35 Minutes

MIDDLE SCHOOL (GRADE 6-8)

AGRICULTURE & FOOD SYSTEMS PROGRAMS



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VERMICOMPSTING ADVENTURES

Vermicomposting is the process of using worms (“vermin” is Latin for worm”) to recycle organic food waste into a nutrient-rich soil. The nutrients recycled by the worms are very valuable to a healthy ecosystem by providing plants with what they need to grow which will feed the rest of the food chain. Students will put their observation skills to use through a lab activity looking at a bin of worms that are actively consuming food waste and creating compost. They will document what they see going on (what foods can they find, where is the compost, any other animals in the bin beside worms?). We will then see the reaction of the worms to different stimuli (dry surface, being picked up, etc.) and take a closer look at their anatomy. This program will focus on the role of the worm as decomposers as well as an in-depth look at how items are evaluated to decide if they are able to be composted through a group sorting and classification activity.

Academic Standard:

Geography Strand-Human Systems #16: The availability of natural resources contributed to the geographic and economic expansion of the United States, sometimes resulting in unintended environmental consequences.

7.LS.1 Energy flows and matter is transferred continuously from one organism to another and between organisms and their physical environments.

7.LS.2 In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

6.ESS.4 Soil is unconsolidated material that contains nutrient matter and weathered rock.

6.ESS.5 Rocks, mineral and soils have common and practical uses.

6.LS.4 Living systems at all levels of organization demonstrate the complementary nature of structure and function.

Estimated Time: 35 Minutes



MIDDLE SCHOOL (GRADE 6-8)

GEOLOGY & LANDFORMS PROGRAMS



STREAMULATOR: POWER OF WATER

Many different processes continually build up or tear down the surface of the Earth. Students learn about factors that affect the patterns and features associated with streams and floodplains such as discharge, velocity, erosion, and deposition, just to name a few. The students will learn how these factors can cause changes in landscapes and landforms via an interactive program with our Streamulator Table. This program covers basic stream anatomy such as a run, delta, bank, riparian buffer, floodplain, riffle, etc. The use of sand and flowing water allows the students to visually see the effects of flowing water through sediment transport, delta formation, erosion, discharge, sedimentation, and velocity.

With the use of the Streamulator Model, students will also see demonstrations and conduct a lab experiment with velocity, discharge, meander formation, and streambank stabilization to understand how water is a powerful force that helps to develop the landscape.

Academic Standard:

6.ESS.4 Soil is unconsolidated material that contains nutrient matter and weathered rock.

8.ESS.3 A combination of constructive and destructive geologic processes formed Earth's surface.



Estimated Time: 40 Minutes

GEOLOGY & LANDFORMS PROGRAMS



RAVING ABOUT ROCKS



What is the difference between igneous, metamorphic, and sedimentary rocks? What is the difference between a rock and a mineral? In this program, students will explore the rock cycle and investigate properties associated with various rocks and be able to distinguish between a rock and mineral. We will view a demonstration using a candle and wire coat hanger to show how rocks inside the earth can be changed due to heat and pressure. Rocks have unique characteristics that allow them to be sorted as well as classified and they form in different ways such as luster, texture, weight/hardness, and color. Students will conduct a lab on Moh's Hardness Scale using samples of rocks that can be found around the area while also looking at texture, particle size/shape, and color to aid in identification of the rock sample.

Academic Standard:

6.ESS.1 Minerals have specific, quantifiable properties.

6.ESS.2 Igneous, metamorphic and sedimentary rocks have unique characteristics that can be used for identification and/or classification.

6.ESS.3 Igneous, metamorphic and sedimentary rocks form in different ways.

6.ESS.4 Soil is unconsolidated material that contains nutrient matter and weathered rock.

6.ESS.5 Rocks, mineral and soils have common and practical uses.

Estimated Time: 35 Minutes

NOT YOUR FAULT

Have you ever pondered how mountains are formed? In this program, we will take a look at how pressures within the earth cause great forces that break and crack the Earth's crust also causing folds or waves to appear on the surface leading to the formation of various landforms. It is through the behavior of seismic waves that we learn more about the composition and properties of the Earth's crust. The first activity will involve the use of three similarly-sized books which will be used to demonstrate various movements of earthquake faults. We will investigate further the immense pressures deep within the Earth causing the formation of various landforms using clay and newspaper.



Academic Standards

8.ESS.1 The composition and properties of Earth's interior are identified by the behavior of seismic waves.

8.ESS.2 Earth's lithosphere consists of major and minor tectonic plates that move relative to each other.

8.ESS.3 A combination of constructive and destructive geologic processes formed Earth's surface.

8.ESS.4 Evidence of the dynamic changes of Earth's surface through time is found in the geologic record.

Estimated Time: 35 Minutes

DIGGING INTO SOILS



How long does it take to build 1 inch of soil and what are the soil formation factors? Students will learn the answer to this question and many more as they explore the world of soil and the importance a healthy soil serves in a productive agricultural system. This program will touch on basic soil concepts but develop an understanding of soil formation factors, soil biota, texture, porosity, permeability, and soil testing. We will talk about how soil texture is determined and perform a soil ribbon test as one method. Then, students will perform tests to determine permeability of various soil materials and time how long it takes for water to pass through different sediments and into the cup below. Data obtained from this experiment will be used in a real-world application to emphasize why it is important to know the properties of a soil when looking to grow plants or for development.

Academic Standards

6.ESS.3 Igneous, metamorphic and sedimentary rocks form in different ways.

6.ESS.4 Soil is unconsolidated material that contains nutrient matter and weathered rock.

6.ESS.5 Rocks, mineral and soils have common and practical uses.

Estimated Time: 35 Minutes



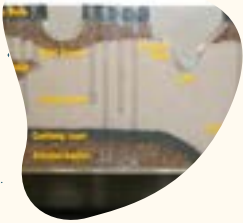
MIDDLE SCHOOL (GRADE 6-8)

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GEOLOGY & LANDFORMS PROGRAMS

GROUNDWATER GAME

Whenever it rains on an open field or your lawn, where does all the water go? This question and many more will be answered with a demonstration of our Groundwater Flow Model. The Groundwater flow model brings to life basic principles of how water percolates through the soil profile by looking through a clear plexiglass side. We will highlight important terms such as porosity, permeability, springs, discharge area, aquifers, wells, recharge area, septic tank, and much more. The Groundwater Flow Model will allow for experimentation with permeability of various soil materials, raising and lowering the water table, water flow in aquifers, and groundwater contamination.



Academic Standard:

6.ESS.1 Minerals have specific, quantifiable properties.

6.ESS.2 Igneous, metamorphic and sedimentary rocks have unique characteristics that can be used for identification and/or classification.

6.ESS.3 Igneous, metamorphic and sedimentary rocks form in different ways.

6.ESS.4 Soil is unconsolidated material that contains nutrient matter and weathered rock.

6.ESS.5 Rocks, mineral and soils have common and practical uses.

Estimated Time: 35 Minutes

FUN WITH FOSSILS

Over time, there have been numerous changes that have taken place on Earth and it is the geologic record that helps to provide evidence of these changes throughout history. Within the geologic record are fossils which provide evidence that many plant and animal species now extinct existed and how they changed over the course of their life. The types of fossils that are present provide evidence about the nature of the environment at a specific point in time and possibly the environmental conditions that caused the animal or plant to go extinct. As the environment changed, so did the types of organisms that could survive in that environment. This program will cover the many types of fossils and examples of each. Students will explore the world of fossils by comparing/contrasting unknown fossil samples to identify them by focusing on features such as size, shape, texture, and modern relative. We will also classify fossil samples based on the type of fossil.

Academic Standard:

8.ESS.4 Evidence of the dynamic changes of Earth's surface through time is found in the geologic record.

8.LS.1 Diversity of species, a result of variation of traits, occurs through the process of evolution and extinction over many generations.

The fossil records provide evidence that changes have occurred in number and types of species.

8.LS.2 Every organism alive today comes from a long line of ancestors who reproduced successfully every generation.

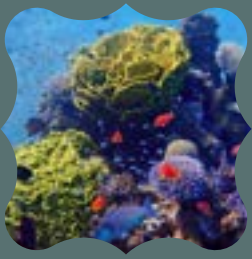


Estimated Time: 35 Minutes

***If there is a topic you would like covered that is not listed, let me know and we can see where it fits! ***

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BIOLOGY PROGRAMS

EXCELLENT ECOSYSTEMS

Ecosystems are dynamic in nature with the number and types of species fluctuating over time and each species serving a specific niche. There are disruptions, whether they are intended or unintended, to the biotic and abiotic components of an ecosystem. Discussion will be held on how organisms serve their ecosystem as a producer, consumer, scavenger, or decomposer and how the quantity of resources an area can provide to support life known as carrying capacity. Students learn that energy can transform from one form to another in living things and the total amount of matter & energy remains constant even though its form and location change known as the conservation of mass and energy.

There are a few options to choose from for this program. When booking, please indicate which activity option you would like.

Option A: Checks & Balances

Students will evaluate hypothetical wildlife management decisions and evaluate at least four factors that can affect the size of a wildlife population. Acting as wildlife managers, students will conduct an activity where they will perform calculations to understand factors affecting a herd of animals. The goal of the activity is to make sustainable management decisions to have a viable population after ten rounds (representing a decade). Students will then share how variables (condition, reproduction, and management) affected the population size of their animal herd.

Option B: Trophic Transfer

In this activity, students will simulate organic production and energy loss for major trophic levels in an ecosystem. The class acts a "growth" assembly line that becomes increasingly complex with each round of play. Students will be able to explain why energy dissipates at each trophic level, contrast the transfer of energy and recycling of material within an ecosystem and be able to relate the role of each trophic level to ecosystem dynamics.

Option C: Owl Pellets

Students will pair up into groups and will be given an owl pellet (sanitized), tweezers/toothpicks, magnifying glass, and a chart displaying the bones of common animals consumed by owls. Students examine the owl pellets, reconstruct prey skeletons, and hypothesize the prey of their particular owl.

Academic Standard:

6.LS.4 Living systems at all levels of organization demonstrate the complementary nature of structure and function.

7.LS.1 Energy flows and matter is transferred continuously from one organism to another and between organisms and their physical environments.

7.LS.2 In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

Estimated Time: 35 Minutes

*If there is a topic you would like covered that is not listed, let me know and we can see where it fits! *

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ENVIRONMENTAL SCIENCE PROGRAMS



4R LAKE: DOING YOUR PART

We all enjoy fresh, clean water, not only for nourishment, but also for recreation and many other uses in our daily lives. This program will help remind us of the simple things that we can do to help keep our waterways clean and healthy for the safe enjoyment of humans and animals. Students will start out with a small baggie with gel to represent a "clean lake". Over the course of the program, we will see how various pollutants make their way to the lake via means such as storm drains/combine sewer overflows and see how these pollutants along with wind and sunlight affect the quality of our water. As various pollutants are discussed, we will brainstorm BMPs (best management practices) that can be implemented to help mitigate the effects of pollution. Students will be able to take their "lake" home and wear it as a necklace with a card that has some reminders on how we all can work together to keep our waterways clean and healthy.



Academic Standard:

- *Decisions about human activities made by individuals and societies have implications for both current and future generations, including intended and unintended consequences.*
- *Sustainability issues are interpreted and treated differently by people viewing them from various political, economic and cultural perspectives.*
- *International associations and nongovernmental organizations offer means of collaboration to address sustainability issues on local, national and international levels.*
- *Human modifications of the physical environment in one place often lead to changes in other places (e.g., construction of a dam provides downstream flood control, construction of a city by-pass reduces commercial activity in the city center.*

Estimated Time: 30 Minutes

SUM OF THE PARTS (NON-POINT SOURCE POLLUTION ENVIROSCAPE)

Many remember August 2014 when the City of Toledo went without drinking water for several days. How did this happen and what can be or is being done to prevent a repeat event? Book this program to view a demonstration of our Nonpoint Source Pollution Enviroscape. A brief presentation will explain the concepts of point source pollution, nonpoint source pollution, hypoxia, eutrophication, best management practices, runoff, and erosion. Students will learn about water movement through a watershed and see how pollution spreads through stormwater runoff, especially through storm drains and combined sewer overflow (CSO) systems. This model will demonstrate the differences between point and nonpoint pollution and learn what BMPs (Best Management Practices) can be utilized to curb the impacts of water pollution. We will also discuss various environmental laws such as the Clean Water Act's application at the federal, state, and local level.



Academic Standard:

- *Human modifications of the physical environment in one place often lead to changes in other places (e.g., construction of a dam provides downstream flood control, construction of a city by-pass reduces commercial activity in the city center.*
- *Decisions about human activities made by individuals and societies have implications for both current and future generations, including intended and unintended consequences.*
- *Environmental concerns, impacted by population growth and heightened by international competition for the world's energy supplies, have resulted in a new environmental consciousness and a movement for the sustainability of the world's resources.*

Estimated Time: 35 Minutes

ENVIROSCAPE MODEL: HAZARDOUS WASTE DISPOSAL & CLEANUP

When thinking about hazardous waste, what comes to mind? What are hazardous wastes and why do we use them? We use them everyday including: fuels, solvents, fertilizer, and pesticides. Thanks to funds from an Ohio EPA Grant, Lucas SWCD has a Hazardous Prevention and Cleanup Enviroscape that will help answer these and many additional questions by helping to visualize this very important issue. This demonstration model will help illustrate issues arising from improper discharge/disposal, or accidental spills along with methods to clean up and prevent spillage of hazardous waste. Sources that are discussed include underground storage tanks, illegal dumping, household/commercial practices. This program will also discuss the impacts to the environment and human health of many of these hazardous chemicals.

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Estimated Time: 40 Minutes





ENVIROSCAPE MODEL: WATER TREATMENT WONDERS

Follow along as we highlight the process of how the water we use on a daily basis is drawn from its source such as a lake or river to the water treatment plant where it is treated and then stored in either a reservoir or water tower with the final step being distribution of clean water to our homes. Do those who live in the country have their water cleaned in the same way? Not necessarily! This program will feature our Drinking Water Enviroscape Model that will highlight the processes involved with water treatment before it reaches our homes and how the wastewater is cleaned at the Wastewater Treatment Plant before it is released back into the environment. For High School, this program goes in more detail by looking at not only the processes involved with water treatment process but understand why it is necessary to conduct these processes, aquifers, groundwater recharge, and more. Discussion will be held on how an increasing population of humans have an impact on the environment as it relates to water quality, particularly the production of bio solids.



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Estimated Time: 30 Minutes

WETLAND MARVELS (ENVIROSCAPE MODEL)

Students will gain an understanding on the characteristics of wetlands as well as learn about and appreciate the vital functions wetlands serve to the environment for both humans and animals. To illustrate the services wetlands provide, students will view a demonstration of the Enviroscape Wetlands Model to learn about the services wetlands provide, the various types of wetlands that exist, and the differences in the health of the environment with and without wetlands. By the end of this program, students will be able to describe major changes in Ohio's environments over time and the organisms supported in each while learning about many of the wetlands near them! We will also discuss go in greater detail to show wetland restoration/mitigation, be able to identify what qualifies as a wetland, wetland types, and the functions of each type of wetland



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Estimated Time: 40 Minutes.

MIGHTY MACROINVERTEBRATES

In this program, we will cover the basics of macroinvertebrates such as their life cycle, classification, and the importance they serve when determining water quality. This program will discuss how macroinvertebrates are classified by how they eat their food and their tolerance to water pollution as an indicator species.

This program will include a "lab practical" style activity with students rotating between two stations. In station 1, Identification skills will be put to the test, as students will work together in groups to identify macroinvertebrate specimen samples drawing on prior knowledge and using a dichotomous key. For station two, students will examine a mock stream with macroinvertebrate animal cards where they will also view a demonstration of the tools used to sample for macroinvertebrates and then sample for macros themselves and keeping track of what macros they find, Data collected during this activity will be used to calculate and then develop a water quality rating.



Additional Option: In the field stream sampling and identification can also be done as part of this program if it is feasible for your group and there is an accessible site either at your school or you have transportation to another stream site. Otherwise, water samples will be collected prior to the program and brought into the classroom for the identification exercise.

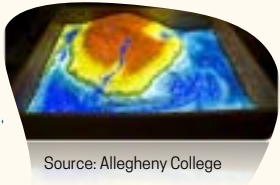
Estimated Time: 40 minutes

ENVIRONMENTAL SCIENCE PROGRAMS



SO THAT'S A WATERSHED?

Watersheds are areas of land that drain water to a certain area or body of water. This includes all the land, air, municipalities, and water found within specific boundaries. In this program, students will learn the major components of a watershed, how they are mapped, and how water moves throughout this natural system. This presentation shows how water is a limited natural resource and how nature is one interconnected system. Students will also be able to compare and contrast how different land uses have an impact on a watershed. Terms such as watershed, runoff, floodplain, spring, contours, and tributary will be introduced.



Source: Allegheny College

Option A: Students will have the opportunity to view the Augmented Reality Sandbox which is a 3D, interactive, dynamic educational tool that will help to understand mapping, topography, watersheds, natural hazards and more. This tool uses a motion sensor and specialized computer software to map contour lines (lines of equal elevation) onto the sand that will adjust the elevation levels of the sand in real-time.

Option B: Students will take part in an activity where they journey through a watershed and see how humans impact the water quality given a certain scenario. They will receive a cup of clean water and either add or subtract a certain number of beads given their choice in the scenario card drawn and the students with the cleanest water at the end (fewest beads in their cup) wins.

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Estimated Time: 35 Minutes

INVADERS!

What would your reaction be if someone came to your house, took over, and didn't want to leave? This program will introduce invasive species (both plants and animals) looking at what they are, how they are transported between ecosystems, and the damage they can present to the native species that have been in that ecosystem all their lives. We will examine how introduction of invasive species can often be accidental but there are instances where it is intentional such as the Ohio Department of Natural Resources (ODNR) stocking a lake with fish to create better fishing opportunities. In this activity, students will participate in a full-body movement "musical chairs-style" game where they will simulate competition for habitat and resources to see the devastating impacts of invasive species but also talk about what solutions can be implemented.

Academic Standard:

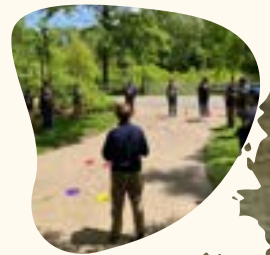
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Estimated Time: 35 Minutes

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CAREERS IN CONSERVATION



Did you know that the world population is estimated to be 9.5 billion people by the year 2050? Do you want to be part of the solution to feed these 9.5 billion people while working to protect our natural resources? Then a career in the agricultural industry is for you! Agriculture can be found in so many places in Lucas County and around Ohio and with that comes a wide variety of valuable and rewarding careers. In this program, students view a glimpse of the careers in agriculture and conservation that are available to them whether it might be the Soil & Water Conservation District, Ohio Department of Agriculture, United States Department of Agriculture, parks district, or research, there are plenty of rewarding careers to be found! Follow along with us as we give a glimpse at our work at the Lucas Soil & Water Conservation District and the career possibilities available in the Soil and Water world as well as throughout the agricultural industry.

Estimated Time: 30 Minutes

FARM TO FORK

How does your favorite food get from the farm to your fork? Students will look at traditional industrial practices/growing methods, explore sustainable alternatives, all while taking into consideration the impact both have on not only human health but environmental health. To understand how food and many other products get to our table, we need to focus on the steps that are involved in the process. In our first activity, students investigate the sequence of production to discover the resources needed and the variety of careers involved to get food from farm to fork through an interactive sorting activity. After learning about the production sequence, the second activity has students taking a look at their food from their lunch to learn the interdependence of plants, animals, and people and learn the importance of eating a variety of foods. Using hola hoops, we will make a Venn Diagram to sort our foods into where they came from such as plants, animals, other and discuss our findings to see if we eat more plants or animals, how are these foods different, and much more!



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Estimated Time: 30 Minutes

VERMICOMPSTING ADVENTURES

Vermicomposting is the process of using worms ("vermin" is Latin for worm") to recycle organic food waste into a nutrient-rich soil. The nutrients recycled by the worms are very valuable to a healthy ecosystem by providing plants with what they need to grow which will feed the rest of the food chain. Students will put their observation skills to use through a lab activity looking at a bin of worms that are actively consuming food waste and creating compost. They will document what they see going on (what foods can they find, where is the compost, any other animals in the bin beside worms?). We will then see the reaction of the worms to different stimuli (dry surface, being picked up, etc.) and take a closer look at their anatomy. This program will focus on the role of the worm as decomposers as well as an in-depth look at how items are evaluated to decide if they are able to be composted through a group sorting and classification activity.



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Estimated Time: 35 Minutes



HIGH SCHOOL (GRADE 9-12)

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GEOLOGY & LANDFORMS PROGRAMS

STREAMULATOR: POWER OF WATER

Many different processes continually build up or tear down the surface of the Earth. Students learn about factors that affect the patterns and features associated with streams and floodplains such as discharge, velocity, erosion, and deposition, just to name a few. The students will learn how these factors can cause changes in landscapes and landforms via an interactive program with our Streamulator Table. This program covers basic stream anatomy and the use of sand and flowing water allows the students to visually see the effects of water through sediment transport, delta formation, erosion, discharge, and sedimentation.

With the use of the Streamulator Model, students will also see demonstrations in regards to water movement across a land surface, stream formation, and how identify various parts of a stream. They will conduct a lab experiment collecting data on the amount of erosion taking place at various rates of velocity and discharge while making observations on examples of erosion, weathering, deposition, and meander formation. The second part of this experiment deals with problem solving by testing three different types of materials that can be used to stabilize streambanks and the effectiveness of each material and brainstorming additional methods that can be utilized to prevent sedimentation and contamination of our water resources.



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Estimated Time: 40 Minutes

ROCKING ON!

Students will investigate properties associated with various rocks and minerals and be able to correctly classify them according to their unique properties. We will view a demonstration using a candle and wire coat hanger to show how rocks inside the earth can be changed due to heat and pressure and another demo using chalk and white vinegar to show how acidic rainwater can dissolve soft rock. Rocks have unique characteristics that allow them to be sorted as well as classified and they form in different ways such as luster, texture, weight/hardness, and color. Students will conduct a lab on Moh's Hardness Scale using samples of rocks that can be found around the area while also looking at texture, particle size/shape, and color to aid in identification of the rock sample.



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Estimated Time: 35 Minutes

DIGGING MORE INTO SOILS

How long does it take to build 1 inch of soil and what are the soil formation factors? Students will learn the answer to this question and many more as they explore the world of soil and the importance a healthy soil serves in a productive agricultural system. This program will touch on basic soil concepts but develop an understanding of soil formation factors, soil biota, texture, porosity, permeability, and soil testing.

Option A: Water Holding Capacity Lab

Students will conduct an experiment on measuring a soil's water holding capacity. We will explore how much water various soil samples are capable of holding for plant use. We will also learn how to conduct a soil ribbon test.

Option B: Model Soil

Students will make a model soil and learn about the various soil components using flour, cornstarch, salt, water, and vegetable oil while also learning how to conduct a ribbon test to determine soil texture.

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GEOLOGY & LANDFORMS PROGRAMS

GROUNDWATER GAME

Whenever it rains on an open field or your lawn, where does all the water go? This question and many more will be answered with a demonstration of our Groundwater Flow Model. The Groundwater flow model brings to life basic principles of how water percolates through the soil profile by looking through a clear plexiglass side. We will highlight important terms such as porosity, permeability, springs, discharge area, aquifers, wells, recharge area, septic tank, and much more. The Groundwater Flow Model will allow for experimentation with permeability of various soil materials, raising and lowering the water table, water flow in aquifers, porosity, explaining water levels in water wells, discharge, and groundwater contamination. Ultimately, we will examine and answer the 4H's about groundwater:

- How much groundwater is there?
- How easy is it for groundwater to move?
- How fast does groundwater flow?
- How good is the groundwater and how does contamination occur?

Academic Standard:

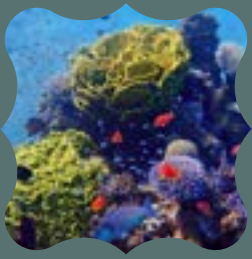
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BIOLOGY PROGRAMS

EXCELLENT ECOSYSTEMS

Ecosystems are dynamic in nature with the number and types of species fluctuating over time and each species serving a specific niche. There are disruptions, whether they are intended or unintended, to the biotic and abiotic components of an ecosystem. Discussion will be held on how organisms serve their ecosystem as a producer, consumer, scavenger, or decomposer and how the quantity of resources an area can provide to support life known as carrying capacity. Students learn that energy can transform from one form to another in living things and the total amount of matter & energy remains constant even though its form and location change known as the conservation of mass and energy.

There are a few options to choose from for this program. When booking, please indicate which activity option you would like.

Option A: Bottleneck Genes

In this activity, students will simulate the gene-pool analysis of a population of black-footed ferrets using colored beads. Students will describe biodiversity as it relates to ecosystems, species, or individuals; explain why genetic diversity is essential to the health of a species; and explain how natural selection favors individuals with traits adapted to their environments.

Option B: Carrying Capacity

Students will take part in an activity called "Carrying Capacity" where they will (1) formulate and test hypotheses related to wildlife populations and carrying capacity and (2) describe the significance of carrying capacity to the health of an ecosystem. In this activity, students will demonstrate the concept of carrying capacity by simulating herds of animals seeking food in a physical activity.

Option C: Owl Pellets

Students will pair up into groups and will be given an owl pellet (sanitized), tweezers/toothpicks, magnifying glass, and a chart displaying the bones of common animals consumed by owls. Students examine the owl pellets, reconstruct prey skeletons, and hypothesize the prey of their particular owl.

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ADDITIONAL PROGRAMS & SERVICES

Take a look at some of the additional services that Lucas SWCD can offer to your classroom or group!



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Field Trip Programs

Located near Whitehouse, Ohio, the Blue Creek Conservation Area (BCCA) is a 500+ acre working farm and conservation/land lab area. Students will explore environmental and agricultural processes occurring in the soils, gardens, and fields; savannahs, wetlands, and prairies; and a live animal presentation from Nature's Nursery Wildlife Rehabilitation Center.



School and community groups may schedule field trips during April -October (or weather permitting). Field trips typically last from 10:00AM–1:00PM but may be adjusted to your needs and topics can be customized. BCCA is open to scheduled groups only. BCCA is a partnership of Metroparks Toledo, Lucas Soil & Water Conservation District, & Nature's Nursery.



A day's program is only \$4.00 per students that are in Lucas County, \$6.00 for out of county (funds go to Nature's Nursery & Metroparks). Teachers and parents are free! Some groups may be eligible for assistance with field trip transportation costs. Please call Lucas SWCD for further information at 419-893-1966 ext. 2# or email ptroyer@co.lucas.oh.us.

Teacher Workshops

SWCD Staff are available for workshops, seminars, and training for you and your staff. We can offer workshops at your school/site as part of your in-service trainings or we will offer workshops at a specific location during the summer. Teacher workshops are offered throughout the year for many of the curriculums listed below and much more!

National Curriculum Offered:

- Project Learning Tree (PreK - 12th)
- Project WILD/Flying WILD (PreK - 8th)
- Science and Civics (9th - 12th)
- Project WET (K through 12th)
- Healthy Water/Healthy People (6th - 12th)
- Leopold Education Project (5th - 12th)
- Project Food, Land & People (PreK-12th)
- Growing Up WILD/PLT (Pre-K)



ADDITIONAL PROGRAMS & SERVICES

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Grant Assistance

Are you unsure of what funding sources are out there to make your projects a reality? Not sure how to get started with a proposal? Let us help you! Lucas SWCD is happy to provide any assistance with finding grant sources, writing a winning proposal, and grant management. Lucas SWCD can also provide workshops/trainings on these topics.



Our office is also happy to be a collaborator or partner on your grant project and provide assistance with carrying out the grant objectives and activities. Reach out to Patrick Troyer (ptroyer@co.lucas.oh.us) to learn more!

Loan Materials

We have an extensive loan library of videos, CD/DVDs, curricula, and reference books available for loan. The following supplies may be loaned out at no charge:

- Enviroscape Models
 - Drinking Water Treatment
 - Nonpoint Source
 - Wetlands
 - Hazardous Waste
- Groundwater Model
- Streamulator
- Rock Samples
- Fossil Samples
- Water Sample Kits
- Septic System Model
- Library materials





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www.LucasSWCD.org



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Lucas County Commissioners

Tina Skeldon Wozniak
Pete Gerken
Lisa Sobecki

The Lucas SWCD wishes to thank the following entities, whose financial support at the local level draws matching funds from the State of Ohio and/or in-kind support that enables the District to provide services to Lucas County:

- Lucas County Commissioners
- Cities of: Oregon, Toledo, and Sylvania
- Townships of: Harding, Jerusalem, Monclova, Richfield, Spencer, Springfield, and Sylvania
- Villages of: Holland; Ottawa Hills
- Lucas County Farm Bureau
- Lucas County Engineer's Office
- In-kind services from the USDA-NRCS, Ohio Dept. of Agriculture, and OFSWCD
- Grants from Ohio EPA and ODA