Environment & Ecology and Agriculture Resources

The resources below provide a variety of free *Environment, Ecology, and Agriculture Education* themed resources for your INTERDISCIPLINARY instructional planning needs.

While specifically intended for teachers and administrators to provide ideas and inspiration as they plan and implement remote learning during this extended closure. However, many of the resources also list general outdoor explorations or activities, citizen scientist opportunities, and virtual monitoring opportunities that your students and their families can adapt as extracurricular/enrichment activities. Be sure to review these engaging activities and adapt as appropriate for your students' grade level.

If you have any questions about these or other resources, contact Tamara Peffer at tpeffer@.gov**.**

PA Environmental Literacy Plan and Chesapeake Bay Watershed Agreement Environmental Literacy Goal Resources

The following resources not only address the PA Chapter 4 Environment and Ecology Academic Standards, but also help your students learn about a key Pennsylvania initiative.

Chesapeake Bay Program
In the effort to restore the Bay and its rivers, dozens of organizations, including federal and state agencies, local governments, non-profit organizations and academic institutions joined forces to manage the work that is described in the Chesapeake Bay Watershed agreement. One of the biggest goals in the agreement is Environmental Literacy Principle partners in this agreement include the Chesapeake Bay Commission, commonwealths of Pennsylvania and Virginia, States of Delaware, Maryland, New York, and West Virginia, and the U.S. Environmental Protection agency. Pennsylvania expanded their commitment to meet all the CBWA goals and have applied them to the entirety of the commonwealth.

Below you will find a list of educational resources that support the PA Environmental Literacy Plan and the CWBA goals.

Chesapeake Bay Foundation (CBF)
Check out this newly launched initiative entitled, Learn Outside, Learn at Home. Over the next few weeks, CBF will be sharing new, interactive, education resources to keep students engaged with the outdoors. These interactive learning resources and

investigations can be done at your home and in your outdoor space. There are video lessons/resources, Nature Journaling Prompts, Student Investigations and Activities, and videos with CBF science experts. Additionally, we're working on a platform for students across the watershed to share the work they have created.
Please check routinely as new content will be added weekly and will also be share on the CBF Learn Outside Facebook Group.
Links:
Learn Outside, Learn at Home
Student Investigations and Activities
Nature Journaling
CBF Learn Outside Facebook Group

Meaningful Watershed Educational Experience (MWEE) framework:
The NOAA Bay Watershed Education and Training (B-WET) program is an environmental education program that promotes locally relevant, authentic experiential learning focused on K–12 audiences. The primary delivery of B-WET is through competitive funding that promotes Meaningful Watershed Educational Experiences (MWEEs). MWEEs are multi-stage activities that include learning both outdoors and in the classroom and aim to increase the environmental literacy of all participants.

- MWEE 101
  Online professional development that helps guide your MWEE development.

- Bay Backpack
  Bay Backpack is an online resource that supports hands-on environmental learning. This site provides funding opportunities, field studies, ancillary curriculum guides and lesson plans, and stewardship/action project support related to the Chesapeake Bay and can easily be adapted to any PA Water Basin or Watershed. This page helps educators find the tools they to help plan or help their students plan Meaningful Watershed Educational Experiences (MWEEs).Through MWEEs, students of all ages develop a sense of environmental literacy, ethics, and stewardship that is essential to the long-term sustainability of their local ecosystems It serves as a brick as the foundation of a lifelong relationship with the environment. (FYI: the video on this landing page highlights work at PA school district that is doing amazing things with the MWEE program)

- WikiWatershed
  WikiWatershed is an initiative of Stroud Water Research Center. The Stroud Center works to advance knowledge and stewardship of freshwater systems through global research, education, and watershed restoration. a web toolkit designed to help citizens, conservation practitioners, municipal decision-makers, researchers, educators, and students advance knowledge and stewardship of freshwater.

- Sea Grant Aquatic Invaders AttackPack

The Aquatic Invaders Attack Pack is filled with materials to help teach groups about Great Lakes aquatic invasive species (AIS), the problems they cause and what can be done about them. Each pack includes preserved specimens of some of the most problematic AIS in the Great Lakes, rugged plastic fact sheets and a classroom guide. Additional materials are below. The packs are designed to complement the Nab the Aquatic Invaders! website hosted by Illinois-Indiana Sea Grant.

National Oceanic and Atmospheric Administration (NOAA) Education: NOAA's office of education provides a wide variety of environmental and earth system science teaching resources, lesson plans, data pools, student volunteer and citizen science opportunities, and online professional development.

- Resource Collections: Resources to help integrate NOAA science into formal and informal education for a wide range ages. Topics include:
- Elementary Science: NOAA resources for your kindergarten through fifth-grade students including, earth, life, and physical science, scientific process, and NOAA careers.
- Freshwater: Sources, processes, and impacts to freshwater environments and drinking water.
- Data Resources
  Lesson plans featuring real-world data collected by NOAA scientists, as well as real-time and historic data.
- Oceans and Coasts
  Physical and chemical processes of ocean and coastal areas.

The National Environmental Education Foundation (NEEF)

The National Environmental Education Foundation (NEEF)
A collection of environmental education resources for a variety of grade levels including activity guides, infographics, and hands-on educational activities.

Highlighted resources from Environmental Education at Home:

- Surrounded by Science Educator Toolkit From the front steps to the solar system, science can be found everywhere. NEEF has put together this collection of lesson plans and curriculum guides to help educators introduce students to some of the many ways they can discover more of the science going on around them, both within the classroom and in the field. Paired with each section are related ***citizen science*** opportunities open to anyone! These projects allow everyone to get involved and contribute to the scientific research that is shaping what is known about the planet. The lessons in this toolkit are an invitation to explore and discover how much of our world really is *Surrounded by Science*.
  - Download Surrounded by Science Educator Toolkit.pdf (5.26 MB)

- Greening STEM Educator Toolkit: The environment is a compelling context for teaching STEM (science, technology, engineering, and mathematics) as it provides teachers with a diverse range of real-world challenges that engage students in hands-on opportunities to apply and reinforce STEM concepts across multiple subject areas. From calculating planting area and productivity in the school garden, to designing model wind turbines, to tracking invasive species with GPS technology, environmental projects inspire students to apply STEM by empowering them to develop innovative solutions to local problems meaningful to them. The educator toolkit provides **free** lesson plans, activities, and resources for teaching STEM using environmental education.
    -  Download GreeningSTEMToolkit_FINAL.pdf (44.85 MB)
    - Take Stem Outside during Earth Week
    - STEM and our Planet - infographics and other resources

- Rooted in Math Educator Tool Kit: In this educator toolkit, you'll find lesson plans, activity ideas, and informational resources all freely available to help you continue to bridge the gap between mathematics and the natural world. Mathematics allows us to analyze current conditions within an environment, make predictions about future trends, and respond in ways that surpass what is possible through simple observation. When looked at in the context of the other STEM subjects (science, technology, and engineering), mathematics becomes a necessary tool in the practice of these fields, enabling the collection and comparison of scientific data that then informs the technology and engineering design of the future. *This year, National Environmental Education Week (April 17-23) is celebrating math, which allows us to analyze current environmental conditions, make predictions about future trends, and respond in ways that surpass what is possible through simple observation.*
    -  Download RootedinMath_EducatorToolkit.pdf (15.43 MB)

- Calculating the Future: Understanding Data sources and modeling techniques. Data about our climate is collected from sources such as satellites, weather stations, buoys, weather balloons, ships, radars, tree rings, and ice cores. These data are then used to calculate climate-related information such as average ocean and air temperatures, rates of sea level rise, and greenhouse gas emission levels.

- Get Dirty! Learning Expedition Toolkit: A downloadable resource that provides step-by-step instruction for planning, conducting, and presenting place-based projects, perfect for home and local based exploration. Additional resources and tips are suggested. Supplemental activities that develop goal setting, leadership, and team building skills are also included. These instructions will help you guide your students and their family through safe nature-based exploration. *Complete the online registration form to receive a link to the document.*

- Hands on the Land Educator Toolkit: This toolkit features several activity guides, lesson plans, and curriculum designed for all ages incorporating public lands from wetlands to urban forests to caves.
    - Download HOL_Toolkit_FINAL.pdf (4.31 MB)

- Engineering a Sustainable World Educator Toolkit: These lessons teach useful correlations, deeper understandings, and real world applications of skills students may not associate with engineering. By incorporating engineering lessons into the other subjects across all grade levels, educators allow students to combine what they've learned in an effort to solve real problems. These lessons and activities encourage students to investigate all the “making, moving and improving” activities involved in the work of an environmental engineer. The processes carried out in these lessons teach useful correlations, deeper understandings and real world applications of skills that students may not usually attribute to the world of engineering.
    - Download EngineeringToolkit.pdf (26.39 MB)

Green and Healthy/Sustainable Schools Support

Green Strides: The US Department of Education’s Public education page related to their Green Ribbon School Program and Health. All links and resources have been vetted by the US Department of Education. Have your students design their own ECOhome plan.

Food Action Matters: The Green Strides affiliate, Commission for Environmental Cooperation, provides a community action/citizen science mechanism for students to learn about food sourcing, nutrition, environmental and agricultural impacts of food production and waste, and sustainable food systems.

Environmental Literacy and Inquiry (ELI) program, Lehigh University: Though written for grades 5-8, this geopsaital, interdisciplinary unit plan can help you and your students develop an understanding of energy audits, use, and generation.

Tree People: TreePeople is working to meet the need of educators, parents, and students who are learning and guiding learning online. There is a large collection of ideas for outdoor classrooms, planting tool kits, Bonus: They will be launching a virtual environmental education virtual program for parents and community members.

Early Environmental Literacy Education: Prek-3 Appropriate Lessons and Resources

Natural Start Alliance

Growing up Wild

Agriculture/Silviculture Education

National Agriculture in the Classroom (or at home):

- National Agriculture Literacy Curriculum Matrix e learning resources: The National Agricultural Literacy Curriculum Matrix is an online, searchable, and standards-based curriculum map for K-12 teachers. The Matrix contextualizes national education standards in science, social studies, and nutrition education with relevant instructional resources linked to Common Core Standards.
- Teacher Center
- Student Center

Longwood Gardens Virtual Field Trips: Enhance your virtual education experience with the Longwood education team. Lessons can be imported directly into your virtual classroom, during which they engage your students in discussion and problem-solving activities as they explore topics through video, images, and hands-on activities.

Sustainable Gardening Institute/Library: one of the easiest ways to incorporate the interdisciplinary aspects of agriculture to your lessons. An online, easy-to-use, curated collection of resources, the documents, images, illustrations, maps, and videos you'll find here are provided by experts at public gardens, arboreta and other nonprofit educational organizations; colleges and universities; and government agencies.

Commonwealth Agency/Partner Resources

Contact Tamara Peffer (tpeffer@pa.gov) if you are interested in any of the materials described at the links below.

Department of Conservation and Natural Resources

- Bureau of State Parks
  - Pennsylvania Watershed Education; interdisciplinary curricular guide for grades 5-12.
  - PA Songbirds; Cooperative effort with DCNR, Audubon, Pa Game Commission
  - PA Land Choices: interdisciplinary curricular guide for grades 5-12.

Department of Environmental Protection: Office of Environmental Education

- Environmental Heritage
- PA Falcon Cam

PA Game Commission

- Seedlings for Schools
- Bird Feeder Bingo
- PA Wildlife Student Guide

- Self-directed lessons for Middle Creek Management Area (can be easily adapted to any PA public land area.
  - Introduction Self-Directed Curriculum at Middle Creek (PDF)
  - Connect With Wildlife (PDF)
  - Decoy Detective (PDF)
  - Feet Are Neat (PDF)
  - Let's Wing It!! (PDF)
  - Scatology (PDF)
  - Skull King (PDF)
  - The Nose Knows (PDF)
  - Wildlife Tracks (PDF)

- Educator's Guide to Celebrating Pennsylvania Bald Eagles and Elk (PDF)
  - Pennsylvania Bald Eagles: Celebrating 30 Years of Restoration film
  - Pennsylvania Elk: Celebrating 100 Years film
  - Pennsylvania Bald Eagles: Celebrating 30 Years of Restoration poster (JPG)
  - Pennsylvania Elk: Celebrating 100 Years poster (JPG)
  - Several images of eagles, other raptors, and elk
  - Pennsylvania Bald Eagle webpage
  - Pennsylvania Elk webpage

PA Fish and Boat Commission
- PA Trout in the Classroom
- Keystone Aquatics Resource Education (KARE)

PA Envrirothon
- Wildlife Study Session 1
- Wildlife Study Session 2
- Wildlife Study Session 3

Pennsylvania Association for Environmental Educators: Teaching from home resources

Interstate Agency Partners

Though these resources are out of state, the environment & ecology concepts addressed are universal and listed states have similar habitat constructs. All resources are easily adaptable to PA natural resources for local learning context. Please reach out to Tamara Peffer (tpeffer@pa.gov) if you have any questions about how to adapt.

New York State Department of Environmental Conservation: Education: Collection of well written lesson plans that will help you address an interdisciplinary assortment of PA Academic Standards with a lens on E&E.

Alliance for New Jersey Environmental Education (ANJEE): Remote EE hub

Michigan's Department of Natural Resources: Natural and Historical Education Resources for Home

North Carolina Office of Environmental Education : To use their Searchable Database for resources easily adaptable to our at stay at home status, select "COVID 19 Education Support"

Celebrate Earth Day's 50th Anniversary from Home!

- PA DEP Earth day; A wide selection of Infographics/Poster, lesson plans, games, and ideas for personal action efforts that can be easily adapted for learning in home and online learning environments check out these accurate resources.

- National Environmental Education Week : National Environmental Education Week (EE Week), hosted by NEEF, is the nation's largest celebration of environmental education. This year, EE Week will take place from **April 20-24, 2020**. To celebrate EE Week 2020, visit the Greening STEM Hub, which provides educators with the information and resources they need to deliver high-quality STEM education by tackling real-world challenges and engaging students with the natural environment.
    - NEEF Earth Day Toolkit

- EarthDay 50: Earth Day grew out of the first Earth Day in 1970, Earth Day Network is the world's largest organizer connected to the Earth Day movement, working with more than 75,000 partners in over 190 countries to drive positive action for our planet. Find ideas about how to observe earth day in your home or neighborhood.

- Pennsylvania Parks and Forest Foundation – 50th Earth Day – Activity and resource clearinghouse with PA connections, including documentaries via the Conservation Heritage Project.

ELL/ESL Support for E&E

PBS Interdisciplinary Environment and Ecology Themed ELL/ESL resources. (See the Resources for Educating English Learners document for more resources.) These links will georeference to your local PBS site but all PBS Learning Media is free. Note: You can select Spanish or English.

- PBS Learning Media
- PreK-K Printables
- Grades 1-2 Printables
- Colorin Colorado
- Sesame Street in Communities (Spanish)

- PBS KIDS games (Spanish)
- PBS Learning Media Content area one-sheets (in English/Spanish): PBS Google Doc archive: http://bit.ly/3aTlCam

The National PROJECTs

Don't forget these vetted, nationally supported lesson plan collections that many of you already have on our shelves. All lesson plans have sufficient background evidence for teachers, parents, and guardians to adapt and apply at home or online.

- Project Learning Tree
- Project WET
- Project Wild – Association of Fish & Wildlife
- Aquatic Wild