Curriculum and Educational Resources for Ag Educators

The National 4-H Council’s 2020 Ag Innovators (AIE) Challenge is the Water Connects Us All Challenge that was developed at Iowa State University Extension and Outreach. This AIE Challenge is a STEM-focused annual program that challenges young people to explore a model of a wetland, foster critical thinking skills, and engage with a real-world agriculture challenge. This collaborative, hands-on challenge helps youth:

- Learn about the importance of water and how it connects us all
- Understand how wetlands provide important ecosystem services
- Create models engineered conservation practices that improve water quality
- Explore career connections related to agriculture and conservation
- Explore conservation practices that improve water quality.

Curriculum Overview

The Water Connects Us All Challenge uses a series of hands-on activities to teach youth about water, watersheds, ecosystem services, the intersection between the nitrogen cycle and crop production, issues with water pollution, and conservation practices to mitigate water pollution.

Activity 1: Background information via discussion and powerpoint
Activity 2: How wetlands work
Activity 3: Engineered Conservation Practices
Activity 4: Watershed Management Authority - Students negotiate with their team to identify and implement practices to have the greatest impact for the community.
Resources provided

- Facilitator Guide with directions for leading the activities
- PowerPoint that provides background information and fosters discussion
- Supplies to conduct the hands-on learning experiences
- Engagement with trained educators who can lead activities via video conference
- An opportunity for educators to participate in virtual professional development

Agriculture, Food and Natural Resources (AFNR) Standards

CRP.05  
CS.06  
ESS.03  
ESS.04  
ESS.05  
NRS.01  
NRS.04

(for more standards details see attached pages)

For more information about Water Connects Us All please contact:

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To request resources for your school, please complete this google form: Registration Form (https://forms.gle/RnTb3MSVoZbi8Bye9)
NGSS Performance Expectations / Standards

**HS-ESS3-3** Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. [Clarification Statement: Examples of factors that affect the management of natural resources include costs of resource extraction and waste management, per-capita consumption, and the development of new technologies. Examples of factors that affect human sustainability include agricultural efficiency, levels of conservation, and urban planning.]

**HS-ESS3-4** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.* [Clarification Statement: Examples of data on the impacts of human activities could include the quantities and types of pollutants released, changes to biomass and species diversity, or areal changes in land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).]

**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 and water)]

**Science and Engineering Practices:**

A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.

[Developing and Using Models]
Agriculture, Food and Natural Resources (AFNR) Standards

CRP.05. Consider the environmental, social and economic impacts of decisions.

CS.06. Analyze the interaction among AFNR systems in the production, processing and management of food, fiber and fuel and the sustainable use of natural resources.

ESS.03. Develop proposed solutions to environmental issues, problems and applications using scientific principles of meteorology, soil science, hydrology, microbiology, chemistry and ecology.

ESS.04. Demonstrate the operation of environmental service systems (e.g., pollution control, water treatment, wastewater treatment, solid waste management and energy conservation).

ESS.05. Use tools, equipment, machinery and technology common to tasks in environmental service systems.

NRS.01. Plan and conduct natural resource management activities that apply logical, reasoned and scientifically based solutions to natural resource issues and goals.

NRS.04. Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.