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| Local Adaptation of Milkweed – *Citizen Science: Monarch and Milkweed Awareness* |
| Introduction |
| This lesson introduces students to their culminating task: a citizen science project bringing awareness of the monarch and common milkweed decline, as well as their research findings, to their community. Students may work alone or in groups. The teacher or the student may choose the type of project best suited to their unique community.  This lesson plan is a component of the *EVALUATE* stage of the 5E Learning Model for the overall curriculum. |
| Objectives |
| After this lesson, students will be able to:   * incorporate prior knowledge and authentic data into a deliverable, * present data in a unique “data jam” format, * propose potential solutions to a large ecological issue, and * disseminate information to a larger audience. |
| NGSS Performance Expectations Addressed |
| Standards  Middle School:   * 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.]   High School:   * HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. [Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.] * HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.[Clarification Statement: Emphasis is on designing solutions for a proposed problem related to threatened or endangered species, or to genetic variation of organisms for multiple species.]   Science and Engineering Practices   * Asking Questions and Defining Problems * Constructing Explanations and Designing Solutions * Obtaining, Evaluating, and Communicating Information   Disciplinary Core Ideas   * LS2.C: Ecosystem Dynamics, Functioning, and Resilience * ETS1.B: Developing Possible Solutions   Crosscutting Concepts   * Cause and Effect * Influence of Engineering, Technology, and Science on Society and the Natural World |
| Information for Classroom Use |
| Approximate Duration for the Task  4 class periods (depending on how much in-class time is given for students to work on their projects).  Assumptions  Students should know or be familiar with:   * The analysis they’ve performed on their data   Teachers should know or be familiar with:   * Data jams * Organizations to partner with for the citizen science component (Native Plant Society, local park, etc.)   Additional Materials Needed   * Computer with internet and projector capabilities * Other materials vary by student project   Supplementary Resources   * Capitol Code Data Jam: <http://capitolcode.mn.gov/> * Hudson Data Jam: <http://www.caryinstitute.org/students/hudson-data-jam-competition> |
| Classroom Task |
| Context  A data jam is a way of uniquely and creatively displaying data. Researchers and students alike have turned their data into dance, music, infographicsand even puppet shows. Students will create a data jam disseminating their findings as part of a citizen science project to bring awareness to the issue of monarch population decline and their recommendations for milkweed transplantation. This provides a community service to build citizenship, as well as a venue for students to practice public speaking and present their research findings. Additionally, since multiple class years will likely be participating, the community will be provided with yearly updates on the research project as a whole.  It is up to you to determine the specific constraints of the data jam and the project as a whole, as well as the avenue through which your students present (such as a native plant society or local park). For example, you might only allow infographic data jams and not dramatic performances; or, your local community theater might welcome a performance by your students to present their research to the public. It is also up to you whether to assign this as a full-class, small-group, partner or individual project.  Task Components  *ENGAGE*   1. Begin with a class discussion based on the following questions:    1. How would the data we’ve gathered and analyzed be useful to our community?    2. Is there any risk posed by moving common milkweed beyond its native range?       1. Should our community plant common milkweed?       2. If yes, does it matter where that common milkweed is from?   *EXPLORE*   1. Have students individually go to <http://www.caryinstitute.org/students/hudson-data-jam-competition/documents-information/presentation-examples> to view examples of data jams. 2. Alternatively, this can be given as homework for students to explore by today.   *EXPLAIN*   1. Using the handout, explain that students will be using a data jam to present their research findings and recommendations to the community.   *ELABORATE*   1. To fulfill the “elaborate” portion, students will work on their project. This can be done during class time or as a take-home project.   *EVALUATE*   1. Have students present their findings to the community; if necessary, also have them present it to the class for grading purposes. |
| Alignment and Connections of Task Components to NGSS Performance Expectations |
| Standards  Middle School:   * MS-LS2-5. *This standard is addressed by having students conduct a citizen science project on milkweed.*   High School:   * HS-LS2-7. *This standard is addressed by having students conduct a citizen science project on milkweed.* * HS-LS4-6. *This standard is addressed by having students focus on local adaptation of milkweed for their citizen science project.*   Science and Engineering Practices   * Asking Questions and Defining Problems – *This practice is addressed by* * Constructing Explanations and Designing Solutions – *This practice is addressed by having students discuss which factors are likely responsible for monarch population decline, then synthesizing a citizen science project.* * Obtaining, Evaluating, and Communicating Information – *This practice is addressed by teaching students about monarchs and milkweed, having them evaluate and interpret that information, and synthesizing a citizen science project to disseminate their findings.*   Disciplinary Core Ideas   * LS2.C: Ecosystem Dynamics, Functioning, and Resilience – *This idea is addressed by having students determine whether or not milkweed is a factor in monarch population decline, as well as whether or not site location has an effect on growth of milkweed.* * ETS1.B: Developing Possible Solutions – *This idea is addressed by having students come up with a citizen science project to address transplantation of milkweed.*   Crosscutting Concepts   * Cause and Effect – *This concept is addressed by having students disseminate their knowledge and research findings on whether or not milkweed is a factor in monarch population decline, as well as whether or not site location has an effect on growth of milkweed.* * Influence of Engineering, Technology, and Science on Society and the Natural World – *This concept is addressed by having students disseminate their findings through a citizen science project.* |