

Lesson: Watch out for Knapweed! - Outdoors

6th grade Colorado Academic Standard 2.1: Changes in environmental conditions can affect the survival of individual organisms, populations, and entire species.

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FEO 1.1.a: Students can interpret and analyze data about changes in environmental conditions- such as climate change- and populations that support a claim describing why a specific population might be increasing or decreasing. Students can interpret and analyze changes in species composition caused by human disturbance (trails) in their local environment.

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Vocab: ecosystem, community, population, producer, consumer, disturbance, abiotic, biotic, vector, invasive, competition, edge effect, habitat fragmentation.

Brief Lesson Description: In this lesson, students explore the impacts of trails as an ecological disturbance and how this disturbance affects native plants by allowing invasive plants to grow.

Performance expectations: Students will be expected to hike to education site, observe invasive and native plant species, and complete handout evaluating what they learned.

Specific learning outcomes: Students will be able to explain why certain species of plants grow in undisturbed versus disturbed areas and the intersectionality of invasive species and trails. They will be able to communicate how to make trails less of an ecological disturbance.

Supplies:

TK journals for kids

4 x # of kids stakes

Pencils

of kids- handouts

of pamphlets for invasive weeds

of pamphlets for native plants

Snacks

Candy as incentives

Measuring tape

Lesson Plan

ENGAGE

- Walk students to area where there is a significant amount of invasive plants and “disturbance.” Gully in Horse Gulch, or flat area near powerline.
 - Explain where we are firstly. Who rides bikes here? Hike? It is a place where a lot of people are!
 - Ever see any animals?
 - Ask what plants they see in this area.
 - Which are native?

Lesson: Watch out for Knapweed! - Outdoors

- Which are invasive? Have them guess!
- At this point, hand out pamphlets about invasive weeds.

EXPLORE

- Allow students to walk around to look at different plants.
 - THEN, split the group up into two
 - Have all numbered “1” go to an area where humans have affected the plant environment
 - All numbered “2” can go to an area where there is no human disturbance!
 - What do you see? Can you identify any plants? Are they invasive or native?

EXPLAIN: concepts and vocabulary

- Call everyone back into a circle. Explain that invasive plants are NOT good for the environment, but to better understand how exactly, we need to learn a little biology!
 - We are currently standing in an **ecosystem**: a biological community of interacting organisms and their physical environment
 - Within an **ecosystem** there are **communities**: group of many different species that interact with each other (biotic only)
 - Name some plants of the area: piñon, juniper, gambel oak, mountain mahogany, etc. these are called **producers**
 - Animals of the area: lizards, squirrels, cottontails, jackrabbits (these are all **primary consumers**) cougars, bears, hawks (these are called **secondary consumers**, but can be **tertiary**)
 - Within **communities**, there are **populations**: single species of organism.
 - For example, knapweed populations are increasing in individuals in this disturbed area!
 - Here, in this **ecosystem**, there is a human disturbance that is affecting native plant **communities**. This disturbance results in invasive plant **communities**!
 - How? What human disturbance?
 - Trails affect communities in **abiotic** (non-living) and **biotic** (living) ways:
 - Abiotic: trails are a disturbance: a place where soil is compacted and plants are removed- not a good place for native plants to grow!
 - Biotic: Humans are **vectors** for **invasive plants**- we carry their seeds accidentally!
 - **Invasive** plant communities do many things to an environment
 - They colonize areas of disturbance FASTER than native plants because they don't have the ecological checks and balances in this unique, new ecosystem (they're originally from Eurasia, not here!)

Lesson: Watch out for Knapweed! - Outdoors

- Colonize especially fast in areas affected by **edge effect**- a phenomena that occurs at the boundary between two habitats where not much can grow
- Invasive plants will out **compete** native plants
- How does this affect the **populations** of native plants?
 - **Populations** of native plants go down through competition, **community** as a whole is affected. Consumers rely on these native plants.
 - All of these invasive species actually are from Eurasia from a similar climate to Durango: dry, arid, cold, high altitude.
- Even more ecological consequences from all of this!
 - **Habitat fragmentation** (of native plants): inability for genes to be spread across a barrier (in this case, it is a wide trail with a bunch of invasive plants, and not native plants)
 - Wind cannot carry pollen across huge areas without little “pit stops” on other tall things/trees- invasive plants tend to be smaller
 - Can eventually lead to the death of an community if plants cannot reproduce efficiently.
- How can we prevent this?
 - Reduce edge effect/ habitat fragmentation by making trails not as wide
 - Sustainable trails: not a lot of erosion- causes more disturbance
 - Restore trails that aren’t sustainable
 - Pull up invasive weeds! (or take the right precautions)

ELABORATE: applications and extensions

- This is how we can justify trail work!
 - Makes it better for trail users (ie. not riding in a rut), but also way better for the environment
 - Trails are also an essential and necessary part of the community
 - Trails are fun! And also good for health
 - Working on them brings people together

EVALUATE: Hand out with ecological definitions defined. Pre-lab questions. Experiment cataloguing different species of plants with quadrant plots.