# LESSON: Succession in the School Yard

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| **Grade Range** | Adaptable |
| **Target Grade** | Middle School |
| **Duration** | Three 45-60 minute sessions |
| **Location** | Classroom & school yard |

## Objectives:

Students will:

- collect plant community data in altered and unchanged plots;
- identify patterns in the data
- construct an explanation for the changes in plant communities in changed ecosystem;
- identify native and non-native plants; and
- understand patterns of succession.

## Outcomes:

Students use real-world data to make explanations on how ecosystems respond to disturbances such as volcanic eruptions, landslides, wildfires, etc.

## Learning Experience:

Students plan and carry out a simple investigation of removing vegetation in a plot and comparing to an undisturbed plot in the school yard. Through surveying the plots periodically over the course of the school year, students collect and then analyze data that can be used to make claims about succession and plant community re-establishment after a disturbance.

## Materials:

*For Outdoor Investigation*

- 8 12 inch pieces rebar with rebar caps*
- Permission from school to mark study plots
- Native plant guides
- Shovel, rakes
- Two Tube densitometers (6inch 1 inch PVC tube)
- Data sheets
- Camera

*For Indoor Analysis*

- Connect to Mount St. Helens by watching NOVA/PBS's Mt. St. Helens: Back from the Dead

- Graph paper
- Online field guides: Burke Museum, USFS Plant Database, WA Native Plant Society

**Each plot requires 4 pieces of rebar. 2 plots at minimum are required; although more students can be actively engaged with 4 or more plots and this provides an opportunity to discuss repetition, data size, and variation.*

## Next Generation Science Standards:

| Dimension from Framework | Connections to the 3 Dimensions |
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| Science and Engineering Practices:<br>• **Plan and carry out an investigation**<br>• **Engage in an argument from evidence** | Students set up an investigation to compare disturbed and undisturbed plant community responses. Student collect and analyze the data and make an claim about ecosystem responses to disturbance. |
| Disciplinary Core Idea:<br>• **LS2.C** Ecosystem Dynamics, Functioning and Resilience | Students understand the ecosystems and the species in an ecological community change over time and in response to both biotic and abiotic events. |
| Crosscutting Concepts:<br>• Patterns<br>• Stability and change | Students observe **patterns** in plant community changes to understand that small changes to an ecosystem can have long term impacts. |

## Background:

**Disturbance Ecology:** Disturbances to a system occur when there is a temporary change to the environment; typically, these disturbances are intense and occur quickly such as forest fires, volcanic eruptions, flooding, landslides and human impacts.

**Ecology Succession:** Ecological succession is the perceived change of species in an ecological community over time.

**Mount St. Helens and Disturbance Ecology:** The May 18, 1980 eruption of Mount St. Helens resulted in a large scale natural disturbance to the landscape. Since the eruption, ecologists have studied changes in soil, fish, mammals, bird, insect and plant communities to examine 1) how does the type of disturbance impact that ecosystem response 2) how have communities developed, and 3) how do species alter successional patters.

## Pre-Lesson Set-Up

1. Find an area that is out of the way in the school yard where you can make your permanent study plots.
2. Mark the four corners of the plot with rebar. Measure out with a tape measure 1.0 m and make sure that you have 90 degree angles. Place a rebar cap on the top end of the rebar. Your end result should be $1m^2$.
3. Mark the four corners of the next plot.

## Instructional Sequence:

**ENGAGE**

1. Start by asking students some guiding questions:

    What causes disturbance to an ecosystem?

    How does life return to an ecosystem after it has been disturbed?

    What patterns exist in the return to life and why?

2. Watch the NOVA Mt St Helens Back from the Dead film.

2. Explain the investigation and ask students to make hypothesize about what will happen over time (use a variety of scales – 2 months, 6 months, 1 year, 2 years, 10 years).

**EXPLORE**

3. Go outside to disturb the plot (first year only).

4. Divide the students into teams and ask students to make measurement and record data following the protocols on the data sheet at each of the plots.

5. Ask student to present their findings and observations.

6. A few months later, go back outside to remeasure your plots.

7. In the spring, remeasure the plots again.

**EXPLAIN**

8. Ask student teams to analyze the data for each plot and then share their data (in the form of graphs) to the rest of the class.

9. What patterns exist?

**ELABORATE**

10. What are some variables that this investigation does not take into account that may influence the data?

11. Look at the time lapse photos from Mount St. Helens long term study plots. http://www.mshslc.org/return-to-life/changing-landscape/

**EVALUATE**

11. Ask students to write a claim using evidence presented by their peers for changes that are occurring to the student plots.

## Adaptations and Modifications:

12. Keep the study plots going each year. Student can then use previous year's data to understand long-term changes and ecosystem resiliency after a disturbance.