GLOBE Green-Down Sequence (K-8)

Through the GLOBE North American Phenology Campaign, students monitor tree green-down over the fall season.

This guide was developed for learners ages 5-13 in collaboration with GLOBE Educator Ellen Ervin (Moharimet Elementary School, NH, USA). Ellen presented how she implemented green-down with third grade students in this GLOBE Green-Down Webinar.

Educator Do-Ahead

1. *If you are new to GLOBE*, create an account and complete GLOBE eTrainings: Intro to GLOBE eTraining, Intro to the Biosphere, and GLOBE Green-down.

2. Select your green-down study site. Choose a site that is easily accessible, has trees with branches that students can reach, and (if possible) is away from buildings.
   ***Video Tutorial**: Selecting a Site and a Tree* (2 min)

3. Set up your green-down site on the GLOBE website or the GLOBE Observer app to be ready for data entry.
   ***Video Tutorial**: Create a GLOBE Green-down or Green-up Data Entry Site*

4. *Optional:* Set up anonymous GLOBE student accounts if students will be entering their own data (more appropriate for older grades).
   ***Video Tutorial**: GLOBE Student Accounts*

Activities:

1. Start with phenomena [30 minutes]
2. Tree observations [30 minutes]
3. Plan and practice [30 minutes]
4. Data collection [40 minute initial visit, 15-20 minutes twice a week through the fall]
5. What story do your data tell?
6. Scientists communicate!

Activity 1: Start with phenomena (Inside, 30 minutes)

Materials Needed:

- Photo slides (PDF) (or create your own!)

Steps:

1. Show students four photos to spark wondering about forests and seasonal change.
2. For each photo,
    a. Ask them to think about and write: what do they notice, what do they wonder?
    b. Share thoughts and questions as a class.

Activity 2: Tree observations (Outside, 30 minutes)

Materials Needed:

- Science notebook or blank paper and a pencil
- Adaptation for K-2: GLOBE Grandma Worksheet (PPT)

Steps:

1. Bring students outside to or near the study site. Ask students to think about these questions, make observations, and write or draw in their science notebook, with about 5 minutes per question:
    a. What do you notice about the trees right now? (observe)
    b. What do you think the trees will look like in 2 weeks? (predict)
    c. What do you think the trees will look like in 5 weeks? (predict)
    d. Why do you think this will happen? (explain)

Activity 3: Plan and practice (Inside, 30 minutes)

Materials Needed:

- Compiled student questions and ideas from Activity 2
- Plant Color Guide (PDF), printed and cut, one guide per pair
- Variety of fruits
- Practice Data Sheet (PDF)

Steps:

1. [5 minutes] Share student predictions, thoughts, and questions from the first site visit with the whole group.
2. [5 minutes] Introduce the question: What happens when the growing season comes to an end, during the time between the end of summer and fall? Explain that they are going to be monitoring leaf color change and sharing their data with students and scientists around the world through GLOBE.
3. [5 minutes] Show the Plant Color Guide tool and explain the study plan:
    a. They will go outside twice a week to collect data.
    b. Outside, students will go to their tree and record the colors of 4 leaves.
    c. When they finish, they will sit together and discuss their observations.
4. [15 minutes] Have students work with a partner to practice using the color guide with fruit, rotating through stations. This could be the same partner they will work with outside.

Activity 4: Data collection (Outside, 40 minutes)

Materials Needed:

- Flagging tape or ribbon
- Silver or black sharpie or white out to tag the tree branch
- Tree identification guide or app
- Plant color guide
- Data sheet and pencil
    - GLOBE Grandma K-2 Green-Down Data Sheet (PPT)
    - Grades 3-6 Green-Down Data Sheet (PDF)

Steps:

1. [5 minutes] Show students the study site boundaries, talk about safety and expectations while outside.
2. [15 minutes] Demonstrate how to tag a tree branch and have students tag their tree branch.
    a. Selecting and Site and a Tree mini-tutorial (video; same link as page 1)
    b. Tree Green-down Field Guide (PDF)

***Tip:** On trees with dark bark use a silver sharpie instead of black to tag the leaves.*

3. [15 minutes] Demonstrate how to use the color guide and data sheet to record the color of their leaves. Have students record the color of each of their four leaves on their data sheet.
    a. Measuring Green-down mini-tutorial (2 min video)
4. When they finish they can sit in a designated spot and discuss their observations with another student or team member.
5. [5 minutes] Wrap up: What did they notice? Do they think the color will change next week? In a few weeks? Will all their leaves change at the same time?

Repeat Activity 4, steps 3-5 twice a week until the leaves have fallen.
Optional: Add to a classroom or school data display (See an example wall graph from Moharimet Elementary School in NH, USA; Padlet)

Don't forget to Upload your Data!

- GLOBE Data Entry Video Tutorials
- Using GLOBE Observer to Record Green-down mini-protocol tutorial (4 min video)

Activity 5: What story do your data tell?

Materials Needed:

- Student data sheets or any data displays made

Steps:

1. Revisit the questions students came up with in Activity 2. Can their data help answer or understand them?
2. What new observations can they make about fall color change now that they have collected their data?
3. [Optional] Print out or display local weather data (temperature, rainfall, daylight hours). What do they notice? Do they think these might affect color change?

Activity 6: Scientists communicate!

Share the story with your school

- Example school display from Moharimet Elementary School (NH, USA; Padlet)
- Have students make a school announcement about their project/observations
- Have students share at a school or community event

Connect with a scientist

- Find a STEM professional from the GLOBE International STEM Network
- Ask parents, local universities or science organizations if someone could come speak to the class or listen to a class presentation.

Connect with another GLOBE school

- See the Phenology Campaign Collaboration page for information on how to connect with another GLOBE school studying phenology.

Participate in the International Virtual Science Symposium (IVSS) or the U.S. GLOBE Student Research Symposia (SRS)

- Showcase your research virtually through the IVSS and get feedback from scientists. Learn more about the IVSS.
- Present a research poster to peers and STEM professionals at a regional SRS. Events occur in the spring around the United States. Learn more about the SRS and how to participate (U.S. students in grades 5-12 only).