# Develop Investigation Plan - Example

## Methods for Assessing Total Schoolyard Carbon



### *Purpose*

- To encourage critical thinking and synthesis of knowledge gained during field engagement activities through the brainstorm and development of potential field methods.

### *Overview*

Students begin by re-examining the research or unit question. Students will use new content knowledge and skills gained during the learning activities to write a basic procedure for collecting the data needed to answer the overarching question. Students will then review the scientific procedure they will be asked to follow and have the opportunity make comparisons and ask clarifying questions.

### *Student Outcomes*

Students will be able to:

- Write a basic procedure for collecting field data.
- Present and discuss their proposed methods with their peers.
- Evaluate their own procedure against the procedure written by Carbon Cycle Scientists.

### *Questions*

Content

- How large are the pools and fluxes of the global carbon cycle?
- How big is a Petagram of carbon?
- How do you determine residence time?
- Why aren't animals included as a pool?
- What role do humans play in the global carbon cycle?
- Is the global cycle in balance?

### *Science Concepts*

Grades 9-12

*Scientific Inquiry*

- Design and conduct a scientific investigation
- Use mathematics in all aspects of scientific inquiry

*Science in Personal and Social Perspectives*

- Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models

### *Time/Frequency*

45 minutes

Should be completed each year before students complete fieldwork.

### *Level*

Secondary (Middle & High School)

### *Materials and Tools*

- Pencil (per student)
- Paper/Science Notebook (per student)
- Previous class work and homework sheets
- LCD project & computer (or another way to display inquiry questions)

### *Prerequisites*

- Field Measurements Learning Activities

### *Preparation*

- Prepare the *Develop Investigation Plan slides* by setting up an LCD projector. If none are available transfer questions onto the white board, chalkboard, overhead projector or individual student handouts.

**Below we provide an example of how to guide students through developing an investigation plan. Also see the accompanying *Developing an Investigation Plan Example* PowerPoint slides. For this example, we chose the essential question: How much carbon is being stored in the forest ecosystem near my school? These can both be modified to fit the essential question you and your students are using for the carbon field measurements.



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## What To Do and How To Do It

**ENGAGE** **Grouping:** Class **Time:** 2 minutes

- Present the inquiry slides to the students.
- Remind them of the Essential, Unit or Research Question. Example: How much carbon is being stored in the forest ecosystem near my school?

**EXPLAIN** **Grouping:** Class **Time:** 5 minutes

- Have students suggest what two major pieces of information are needed to answer the essential question
- Write ideas on the board, overhead or directly on power point slides.
- After all major ideas have been presented show students that they should all fall into two categories. Post the categories in a place where all students can see them.

1. How much carbon is stored in a given area of your schoolyard?
2. How much of your schoolyard is covered by trees?

**ELABORATE** **Grouping:** Small Groups **Time:** 20 minutes

- Students work in small groups to determine what methods/steps are required to answer each of the questions.
- Assign each group a quadrant name: north, south, east or west.
- Instruct students to write down all the individual steps they think it will take to answer each question.
- Remind them they can use their class notes, activity worksheets or homework to help them.

**EVALUATE** **Grouping:** Class **Time:** 15 minutes

- Students present their field protocols formally, informally or participate in a class discussion.
- Have someone keep track of the steps on the board, overhead or screen.
- Post the slides and discuss how student's answers were similar or different to those suggested by the Carbon Cycle Scientists.
- (If you have an advanced class, challenge them to develop a clear procedure that could be used by the class instead of the provided *Student Field Guides*. You may have to provide students with a little more information, such as all trees on the sample site will need to be mapped so they can be measured every year).
- Discuss next steps: Students will set up and map the trees on a Carbon Cycle Sample Site OR if one is already set up see *Discussion Points Site Visit - Years 2+* in the *Site Set-Up Teacher Guide*
- Students should complete the *Determining Scale and Calculating Area* activity (on the Data Interpretation page- http://globecarboncycle.unh.edu/DataInterpretation.shtml) for homework or as an in class activity after completing field work.