Safety Considerations

Working Near Streams:

- Check with the EPA website. Are there dangerous chemicals in the water that students need to avoid or wear safety goggle or gloves for? What about bacteria in the water? Be sure to warn students about the dangers of accidently drinking the water.
- Kids *can easily* fall in the water, despite best preventive efforts. What can you do to get them warm and dry as soon as possible? Is hypothermia a concern? How can you help prevent them from falling in?
- Check out the area ahead of time and look at areas where students can sit and work. Are the stream banks steep? Is it really muddy, possibly making walking difficult? Are waders needed to get water samples or is there a safe spot to work at the water's edge?

Working with Tools and Scientific Equipment

- Check with the manufacture and instructions for any notes about hazardous chemicals or parts of equipment.
- MDSD information can also be located at *www.msdsonline.com/*
- When using any tools (e.g., shovels, rakes, hammers) be sure to conduct a discussion ahead of time about safe use of the tools. Also be sure to provide some gloves for your students to reduce blisters.

Clothing

- Proper attire is always important when in the field. Check the weather forecast and consider what will happen if students experience the highs and lows in your area. What should they wear to stay warm or to keep from getting too warm?
- Do they need sunblock or sunhats? Extra layers to protect against the wind, rain or snow?
- As a general rule, all students should always wear closed-toed shoes for all outdoor adventures!

Developing a Service Learning Project with Your Students

Identify a Problem

- Is there something that concerns you or your students in your area?
- What resources are near your school? (e.g., a creek, forest, park, wastewater treatment facility, or recycling center) How can these areas be improved or assisted?

- Brainstorm with your students and see where their interests lie.

Identify Resources

The following institutions, organizations, and agencies often willing and equipped with tools and resources necessary for outreach opportunities with local schools.

- Community colleges and universities
    - Teacher preparation programs. Preservice teachers and faculty responsible for their practicum experiences are often looking to infuse practical, authentic teaching and learning experiences.
    - Science programs. Undergraduate and graduate students often need outreach teaching experience and have access to state-of-the-art science equipment they can share with your students.
    - Outreach centers or extension centers. Even though the main campus might not be near your town, the extension center can often borrow equipment from the main campus for you to use in with your class.
- Local Forest Service office, national park, or state park
- Local Department of Environmental Quality or any state or local agency
- Local Department of Fish and Game or Wildlife; Department of Environmental Quality, County Soil and Water District, Tribal Fisheries or Bureau of Land Management.

Other options worth exploring:

- Museums
- Libraries
- Municipal waste, water treatment centers, and power companies (they have to test water quality, too!)
- Farms or growers (may have water and soil testing equipment)
- Factories or companies of any industry. They often have lesson materials available and equipment to borrow

Equipment Resources: Vernier, Forestry Products, Ben Meadows, YSI, That Fish Place, Ocean Systems

When in doubt – ask! It never hurts and you will be amazed at how many resources are available around you!

Funding

- Grant Sources: More Kids In the Woods grant (U.S. Forest Service), Charlotte Martin Foundation, Idaho Community Foundation, Lightfoot Foundation, American Fisheries Society, Department of Environmental Quality 319 grant.
- Websites:
    - Grant Wrangler *www.grantwrangler.com/*
    - The NEA Foundation *www.neafoundation.org/pages/grants-to-educators/*
    - Teacher Planet *www.grants4teachers.com/*
    - Fund for Teachers *www.fundforteachers.org/*
    - Epsilen *http://www.epsilen.com/MyPortal/Public/CustomTab.aspx?tabID=16034&prefix=VanessaAran*

Motivation

- Drum up enthusiasm from your students by asking the following questions:
    - How can we help with this area?
    - Why should we care? What might happen if we didn't get involved?
    - Does it feel good to help out someone or thing when it's needed? Would this feel good to be a part of this effort?
- Find motivational videos! The internet is full of kids doing amazing things. Here are a few examples:
    - Pintrest Inspirational Videos for Students www.pinterest.com/terrieichholz/inspirational-videos-for-students/
    - Hands-On Learning In and Out of the Classroom: Garden-based service learning www.youtube.com/watch?v=B1AjhZOx5kY
    - Service Learning: Explanation of the movement. www.youtube.com/watch?v=VqKTzW3j6Bk
    - Ted Talk - Adora Svitak: What adults can learn from kids www.youtube.com/watch?v=V-bjOJzB7LY
    - Beau Lotto + Amy O'Toole: Science is for everyone, kids included. Amy O'Toole and her class published their research! www.youtube.com/watch?v=0g2WE1qXiKM
    - Dragon Fly TV. Students created a video about their snow science experiment.

http://pbskids.org/dragonflytv/show/snowshelter.html

- Caps for Kids Service Learning Project, a project to provide kids with cancer hats. www.youtube.com/watch?v=JORaXIcG2c8
- Edutopia, lots of cool stuff! www.edutopia.org/schools-that-work

Overview of a General Lesson Plan for a Citizen Science/Service Learning Project

Lesson Plan: Citizen Science/Service Learning Project

Essential Questions:

- Is there some area in need of an improvement or problem to solve in or near our school?
- What are the science and engineering elements we will need to understand to accomplish our goal? How could I apply that to my curriculum?
- How can we communicate about our efforts to benefit others in our community?

Project Overview:

We are going to identify an area near our school that we can study, help restore, and communicate our efforts about to others. To prepare for this we will explore the science around the ecosystem we will be working in. We will also explore the various technology, engineering, and other learning options for monitoring and improving our site. After learning about our area, what we can monitor, and what we can accomplish, we will then create a plan to implement once we have all the pieces we need. Throughout this process we will communicate about our efforts. Communication can be in the form or a blog, school newsletter, video, podcast, or public meetings.

Session 1: Introduction to your project and review of habitat

Goals:

- To introduce project to students
- To determine an area of focus
- Brainstorm ideas of action
- Identify the habitat

Time: 2 hours

Description: Start brainstorming with students about areas around the school or community that could use their attention. Has anyone ever noticed an area near the school that has a problem that needs to be

addressed? That could be better designed? What might be going on there? What can be done to improve it? Or, if there isn't such an area, is there an area that can be studied, a park, stream, forested area? What can we study about that area? Try to lead students to agree on an area they'd like to study. You may find later that the area has a problem to address, even if it may not be apparent initially. Once an area is determined, then direct the students to brainstorm what can be done for that area. Is there a restoration, public education, or research goal that can be agreed upon for that area? After these questions are answered or narrowed down, then define the ecosystem for that area. What are characteristics about that ecosystem that can be observed? Examples include temperature, soil pH, soil moisture, carbon dioxide and monoxide in the air or water quality characteristics.

Session 2: Explore the Habitat or Ecosystem

Goals:

- Define the ecosystem of your study area
- Compare this ecosystem to others by initial observations
- Understand the characteristics that can affect this area
- Collect original base-line data

Time: 2 hours

Description: Take the students to the area to be researched. Compare this site to others that are similar. What are the differences between this site and others? Are these differences beneficial or harmful to this site? What environmental and human impacts may harm this area? Collect data for your area (an explanation of how to use the tools prior to being the field might be preferred). Note: If time has not allowed for tools to be obtained at this point, this can be done without collecting measurements and just with observations from the five senses.

Session 3: Factors that influence the health of your site

Goals:

Explore factors that affect the habitat

Explain the relationship between any of the these factors

Build a model of an improved or healthy habitat similar to this area

Time: 2 hours

Description: From the list created from session 2, explore what can affect the characteristics of your site. For example, what might affect the temperature (think about pavement versus grass, shade versus

full sun, etc.)? What could affect the other parameters you will be measuring? Help students define what healthy and not healthy looks like for each of those characteristics. For example, what pH do plants thrive in? Do any of these factors affect each other? Dissolved oxygen is affected by temperature and water, and soil moisture can be affected by temperature. Have students draw, build, or write about what a healthy habitat or ecosystem for your site would look like. Have students compare this model to what they observed.

Session 4 and 5: Testing Your Site

Goals:

- To help students gather data while exploring the question "Is this an ideal habitat?"
- To continue practicing quality data collection techniques
- To begin creating communication artifacts

Time: 2 hours each session

Description: Collect several rounds of data collection to be able to determine a trend in the data. This can occur over one week or throughout the year depending on access, time, interest, and objectives. Emphasize the need for consistency in data collection with your students. Determine how your students will communicate their data and findings. Are there citizen science websites that collect similar data? Is there a blog, newsletter, or podcast they can post their findings? If there isn't, this would be a great time to have your students create one and maintain it for other projects!

Session 6: Data Analysis

Goals:

- Compare and contrast data
- Use graphic organizers to explain differences and similarities between data
- Formulate hypothesis for difference and similarities between data
- Draw conclusions of your research site

Time: 2 hours

Description: Help guide the students to compare and contrast their data. This can be facilitated by having them create bar charts, pie graphs, or other visual representations of their data. Regardless if they are comparing data from different sties or the same site on different days, encourage them to create new hypotheses for the differences and similarities. It could lead into another great project to explore these hypotheses! What conclusions can be drawn from the data? Is there action that needs to

take place from these conclusions? Students can weigh in with their opinions via a debate, an essay, or a speech. Be sure to share their findings and what you plan to do next with your audience!