

Lesson Plan: Science

6. Learning Activity: Data Gathering. There are a number of activities involving the gathering of data related to *Sagittaria latifolia*, that are standard scientific procedures and practices, one of which will be suggested here. As a science instructor, there may be other learning activities you have developed that can be applied to the water potato or another plant you might want your students to learn about. In all these activities it is important to have student record their observations in a clear and precise manner, using a standard and agreed upon unit of measurement, such as a metric system. It is important to make sure the results of your student's observations can be compared with the standard units of measurement used by the scientific community. Also insure that your students are recording their findings on a format that is stable and accessible for future referencing. Students in the future will need to access and understand the design of your collected data. Keep logs and record data on a secure computer drive.

Before initiating any data gathering of *Sagittaria latifolia* you must secure permission from the appropriate land owner, if private land, or state or federal agency, if public land. In the instance of the southern third of Lake Coeur d'Alene, it is under the jurisdiction of the Couer d'Alene Tribe and permission from the appropriate department needs to be secured before data collecting.

One very insightful observation will be to measure the water content of water potato leaves, along an environmental gradient, from the driest site to the wettest site. To measure the water content students would collect the sample leaves and weigh them. Leaves would be the best item of the plant to collect. Take a few close to shore and a few deeper in the lake's water. But your sample size need not be large, removing only a few representative leaves within a colony. Do not take so many that it might injure the plant. We must respect the plant we seek to learn so much from. Keep the sample fresh, without transporting them in added water.

Also note the nature of associated riparian flora and fauna. What other plants are growing in association? What other animals and fowl might be observed associated with the colonies of water potato? Note the presence or absence of typical and expected flora and fauna. What time of the day are these observations being made? Also note the temperature in both in the air and in the water. And observe any other natural or man-made factors in the area within which the leaves are collected.

The day of being collected, place them in an oven at 60C overnight and then weigh them again the next day, i.e., their dry weight. The formula for calculating water content is $\text{water content} = (\text{fresh weight} - \text{dry weight}) / \text{dry weight}$. You can express the findings as grams of water per grams of dry leaf tissue. Record the date and location of the sample, and the water content findings.

Leaves can be collected from various locations along the lake, comparing size of the leaves with their water content. It may be observed that some of the colonies of water potato have larger leaves, when compared with other locations. Is there also a water content difference? Please note that the areas where water potato grow along the lateral lakes linked to the Coeur d'Alene River have had over 100 years of mining pollutant contaminants added to these ecosystems. It is not only not advised to eat these tubers, but not to enter the waters and collect their leaves.

Leaves can be collected at different times of the year, recording their water content.

Leaves can be collected from year-to-year, recording their water content and any changes. When conducting annual data collecting, be sure to align the activity with the date, time and location of previous collections.

If the tubers of the associated collected and recorded leaves are also gathering in October, noting their size and shape.

7. Learning Activity: Data Analysis. There are a number of activities involving data analysis related to *Sagittaria latifolia*. One will be provided here as a follow-up for the data collecting activity just discussed. As a science instructor, there may be other learning activities you have developed that can be applied to the water potato or another plant you might want your students to learn about. This particular

With the water content measurements collected and recorded, you are now ready to provide analysis of the data. Compare the leaves from wetter sites with those less wet, compare larger leafed water potato with smaller leafed plants, and compare water content from leaves collected one year with leaves collected at the same site but a year or two later. Over many years, can any trends be charted? Compare the flora and fauna data of the sites and dates collected. Are there any changes?

Given the range and types of data collected annually, and the observed changes over a number of years, all understood as dependent variables, can the students identify and suggest any independent variables that might be contributing to these changes? Have the students develop their own theories for any changes, each well-grounded in the empirical data they have been gathering. Have the students conduct a literature search on related theories and their relevance to their findings and theorizing.

Based upon the data gathered and the analysis made, have the students suggest strategies to help preserve and perpetuate the health of *Sagittaria latifolia*. Who should be contacted and consulted with to help with any implementation plans for water potato? The research efforts of your students should be applied back to help benefit *Sagittaria latifolia* and those who revere and rely upon it.