The Residential Tree Project (Descriptive, Comparative, & Correlative)

Where is Waterville?

Native plants are regulated by the geography, geology, soils, rainfall and other variables within their environment. Washington is divided into 13 ecoregions and 30 vegetation zones. An ecoregion is a contiguous geographic area of similar climate and geological history. A vegetation zone is an area in which moisture, temperature, elevation, and other environmental parameters combine to create conditions that favor similar vegetation communities. Waterville is in the Columbia Basin Ecoregion and in the Three-tip Sage Vegetation Zone where riparian habitats are dominated by Black Cottonwood and White Alder trees. Ponderosa Pine woodlands occur in sheltered ravines and are found on Badger Mountain which is in Ponderosa Pine Vegetation Zone. The City of Waterville is two miles square. *(Geography EALR's xxxx).*

The History of Waterville

As settlers traveled west, they found a good source of Waterville and began farming over 100 years ago. Trees on Waterville Plateau were found along the side creeks (e.g., riparian areas) ravines, and foothills of Badger Mountain. As more settlers arrived, and as larger cities developed along the Columbia River, people settling in Waterville brought along favorite plant seeds to remind them of the previous homes or for food, such as cherry trees. Some non-native trees thrived because the owners continued to fertilize and water them. *(History EALR's xxxx)*

Project Design - Phase 1 (Identify a Setting within a System and Identify variables of Interest)

The City of Waterville registered as Tree City USA and in doing so, wanted to develop a map of the trees on public property. Two 6th grade students worked with the City and created an ArcView map of all the 468 trees that were counted. An Excel spreadsheet was created with a list of attributes the City wanted. Besides the type of tree and location, other attributes included the status of the tree, its condition and maintenance dates. Waterville was divided into 6 equal sized grids. Trees were digitized onto aerial photographs, one grid at a time and each was given an identification number. The same number was used to identify the tree in the Excel spreadsheet. Using ArcView, the two files were linked and any user can query the database to ask questions such as "Where are all of the Locust trees?" or "What trees were pruned in 2005?" *(History EALR's xxxx, Math EALR's xxxx, Geography EALR's xxxx)*

Project Design – Phase 2 - Descriptive

If the City was going to check the trees for disease and insects, the students wondered why the rest of the trees in Waterville were not mapped, because all of Waterville's trees could get the same disease as a City tree. A presentation of the project was given to the high school agriculture class and they agreed to continue the project to map all the residential trees.

The first question was "What and where are all the residential trees in Waterville?" The students already had an ArcView map of Waterville with the public trees. Another layer

for the residential trees is required to keep the tree databases separate, as well as a new Excel spreadsheet, with tree measurements and conifer or deciduous as additional attributes *(Geography EALR's xxxx, Math EALR's xxxx, Science EALR's xxxx).*

Methods (Collect Data)
A survey was developed and sent to homeowners in Waterville. *(Writing EALR's xxxx).* Students will collate the information then create an Excel spreadsheet. When the spreadsheet is completed, the trees will be digitized using ArcView. *(Math EALR's xxxx, Geography EALR's xxxx).*

Results (Analyze Data) - Comparative
The City and residential tree data will be compared and graphs will be created to illustrate the number of trees in residential to public properties (bar graph); the number of conifer versus deciduous trees (bar graph); native to non-native (bar graph); tree species (pie chart); and the percentage of tree sizes/ages (pie chart). *(Math EALR's xxxx)*

Discussion (Use Evidence to Support and Explanation)
Based on the data, what did you conclude? Are there more deciduous trees than conifer trees in Waterville? If so, how much water is used to keep those trees alive and healthy? Water conservation is an issue, can other techniques be used, such as drip irrigation to reduce the amount of water? (These data can be used by the **6th graders** for their water project). Also, deciduous trees are dormant over the winter, while the conifer trees are collecting water, conducting photosynthesis, and storing water to be released during the hot summer. Deciduous trees are opposite, taking precious water during the summer for their own use.

What birds are living in Waterville because of the different trees? This is part of the **2nd grade project.**

What insects are in Waterville, and which are found in and on trees? This is part of the **3rd grade project.**

Caterpillars use different trees for food and to pupate. This is part of the **1st grade project.**

The geology and geography that makes Waterville Plateau unique is part of the **5th grade project.**

Middle school biology students study trees, their photosynthesis, growth, etc. These data can be used by those students.

Future Directions for a Long-term project – Correlative
Is there a relationship between the health of the trees and the amount of watering? Is there a correlation between the use of pesticides, herbicides, and fertilizers and chemicals found in the City's wells?

Math students could use these data to develop models based on the spread of wind-borne diseases; learn algebraic equations based on querying the database; learn geometry through the trees – circumference, diameter, tree height based on angles from the sun; modeling of water transportation from roots to tree tops.

Biology students can take tree core samples to age the trees.