CMaP PROJECT

Project Title: Wetlands, Water, Weather...WHERE?!?
Created by: Angie Poulton and Kristina Reeder
Class: Fourth Grade Classrooms, within Washington County School District

Project Description	For my project, I will be directing students in the GPS mapping of 6 locations along the Santa Clara River. In addition to the locations, students will be collecting water samples, cloud cover data, and weather over time at these specific GPS sitemaps. Data will be collected from geocaching visitors, community members, BLM Personnel, USU Water Quality Extension, as well as other visiting fourth grade classrooms throughout the Snow Canyon conesite. USU Water Quality Extension Agency (Assistant Professor Hope Braithwaite) will be the joint community partner for this project. Utah Water Watch programs and Stream Side Science will introduce the PBL components and standard objectives.
Community Issue or Problem Selected -How project evolved?	Santa Clara River is a tributary of the Virgin River. Gathering data on the water quality, amount of flow and rate, and the different species that live in and around the water would benefit the students' understanding Utah's flora and fauna. The data could also be a helpful resource for Utah's land management organizations. Using tools such a geocaching and ArcGIS maps and surveys, students could combine data with other groups who would visit the caching sites. They would also gain a better understanding of working together amongst themselves and other groups in the community. Combining data with other groups would help students understand how information is gathered, utilized and shared. The Utah State University (USU) Water Quality extension strives to record the water quality of all rivers and streams in Utah. It is my objective to combine efforts with other 4th

	grade classes to provide information on the Santa Clara River that the USU Water quality extension could use. Working with Hope Braithewaite (the extension liason), I was able to get certified in measuring the necessary water attributes for their program. I will teach these procedures to the other teachers and we will then direct our students to do the activities.
Community Partner(s)	In addition to USU Water Quality Extension Agency, other community partners include City of Santa Clara, Arrowhead Elementary, Paradise Canyon Elementary, volunteer parents, City of St. George, Santa Clara Neighbors, and the Bureau of Land Management.
Project Objectives	Long Term Objectives: Provide mapping coordinates/online map for specific sites along the Santa Clara River, and tributaries. Identify clouds (Cirrus, Status, Cumulus) over time and seasons. Collect water samples to assess the health of local watersheds, as they reflect on the viability of plants and animal life. Collaborate with adjoining fourth grade classrooms and schools to create ESRI map layers, storyboards, and real life connections with the world in which they live.
Utah Core Standards/Objectives	Utah Fourth Grade Science Standards: Standard 2, Objective 1.a - Identify basic cloud types (cumulus, cirrus, stratus) Standard 2, Objective 1.b - Observe, measure, and record data on the basic elements of weather over a period of time Standard 5 - Students will understand the physical characteristics of Utah wetlands, forests, and deserts, and identify the common organisms for each environment

	Utah Fourth Grade Social Studies Standard: Standard 1, Objective 1 - Identify Utah's latitude, longitude, hemisphere, climate, natural resources, landforms, and regions using a variety of geographical tools Utah Fourth Grade Writing Standard: Standard 4.7 - Conduct short research projects that build knowledge through investigation of different aspects of the topics
Essential Question(s) -Spatial Issue	What is the environment like along a portion of the Santa Clara River? How does the environment change throughout the year? Do these changes affect the environment? If so, How? (to align with the Utah State University Water extension program): What is the water quality like at _____ time of year: water temperature PH oxygen level turbidity eccoli presence of macroinvertabrates
Assessments (rubrics, scoring guides)	Collaborative Journal/Data Collecting Portfolio - Each geocaching box will contain the data sheets for collection throughout the year and compiled into a final summative portfolio. If physical geocaching boxes are not used, the alternative would be to use ESRI Survey 123 to collect the data online. This data can be analyzed over a spatial time period of 6-9 months. A direct link to the survey created can be found with this link: http://arcg.is/0bGeLu ESRI Mapping - Layers of data will be measured, graphed, and published publicly between the joint schools that are

	collaborating together in regards to the year-long project. This data analysis will be shared with district personnel, BLM, and USU Water Quality Extension Agency (Assistant Professor Hope Brathwaite).
Project Products	One product that would be realized by this project is a map created on ArcGIS with different layers showing information about the river according to times of year. Another product would be a geocaching site for community members to visit and participate in.
Project Timeline (include a step by step Procedures)	● Over the summer, we will introduce our idea to the 4th grade teachers of Snow Canyon Cone Site in the Washington County School District and invite anyone to participate. This invitation will be accompanied by a sign up sheet for them to pick which month they would like to visit the site. ● Over the summer, we will also gather the material for 6 cache boxes, contact BLM and city officials. As necessary, we will ask individual neighbors permission to place boxes near their properties. We will ask for 12 survey markers to mark the spots where the coordinates take the students. ● Teachers would teach the science and social studies content according to the curriculum map, perhaps front loading some information as necessary. ● Our attention-getting activity would be a geo-caching one, where we would show the students how geo-caching helps them connect to their environment (and how fun it is). This would take place in the fall for the first few classes, but could take place around the time the class is designated to visit the site. ● Before the designated time to visit the site, teachers will give students and opportunity to practice taking water samples and filling out the charts. ● Teachers will arrange for the field trip; procuring a bus and at least 6 volunteer helpers (who have smart phones with GPS apps); one per cache box. The bus will take the students to 2 locations on the Santa Clara River, approximately 4 miles apart. ● After the field trip, students will use the data to create layers on an ArcGIS map.

	● Students will write a research paper about their experience. ● At the end of the school year, the class will investigate the different layers of theArcGIS map. Students will discuss their findings.
Resources Needed	6 geocaching boxes; each containing: a water sample kit a journal to log the visit a spreadsheet to record different data that was observed, such as: ● water quality and rate of movement ● flora ● fauna ● cloud formations ● overall weather ● objects of interest. In accordance with the Water extension, kits will be available to measure: PH, turbidity, oxygen levels, temperature, eccoli, appearance of macroinvertebrates.
Skills Required	● Operating water quality instruments ● Knowing how to observe, measure, and record data on the basic elements of weather over a period of time ● Understanding cloud formations and terms ● Understanding the physical characteristics of Utah wetlands, forests, and deserts, and identify the common organisms for each environment ● compiling information into a short research project that build knowledge through investigation of different aspects of the topics ● Using geographical tools such as compasses, geocaching technology, and mapping
Project Team Member Roles	**Teacher(s):** Fourth grade teachers at each respective school will spear-head the field trip discovery day, as well as data measurement, collection, mapping, and assessments over time. They will also oversee collaboration with community stakeholders, district personnel, and USU Water Quality Extension Agency. **Parent Volunteers:** With guidance from school teachers, parent/community volunteers will facilitate groups of 4-5 students. During the hands-on discovery day, volunteers will assist where needed with data collection and student management, and student feedback.

	Students: Groups of 4-5 students will be assigned the following roles: data collector, journal keeper, team leader, and field operator(s). Students will work collaboratively, using effective communication, to demonstrate critical thinking skills. Specific data will be collected in relation to water quality, weather, cloud cover, as well as plants and animals native to Utah. Data will be collected using Utah Water Watch Data Sheets and/or Survey 123. **Partner(s):** City officials, BLM personnel, community citizens, and local stakeholders will also participate by assisting in data collection, geocaching, mapping, environmental education, and fostering of global habitat maintenance. **USU Extension Agency:** Assistant Professor Hope Braithwaite will assist as our off-site field expert. She will provide as-needed feedback regarding water quality parameters, out-liers in data collected, and education regarding local macro-invertebrates observed.
Celebration/Presentation	Different 4th grade classes from the district will come together to create a presentation for the School Board to showcase the information we have gathered and what we have learned. Visitors from the USU Water extension will visit and congradulate the students on the data they have collected for the extension. Pictures will be submitted to local news agencies.
Project Evaluation	Rubrics on the content of different domains will be in place to assess the understanding of the content. This will determine the amount of knowledge the students came away from the project with. Students will also participate in an interest survey to determine the level of engagement in this project. The level of ongoing participation (visits and data recording by other groups) and maintaining (adding layers to the ArcGIS maps) this project will also be a measure of it's impact.
Project Bibliography	https://www.esri.com/en-us/home

	tp://extension.usu.edu/waterquality http://extension.usu.edu/utahwaterwatch http://streamsidescience.usu.edu http://ut.water.usgs.gov/ http://www.water.utah.gov/droughtconditions/BasinDroughtReports/ http://www.water.utah.gov/droughtconditions/reservoirstorage/default.asp http://www.usclimatedata.com/climate/utah/united-states/3214 https://geonames.usgs.gov/apex/f?p=gnispq:3:0::NO::P3_FID:217989 https://www.fs.usda.gov/recarea/dixie/recarea/?recid=71228 https://www.americansouthwest.net/utah/santa-clara-river-reserve/index.html https://en.wikipedia.org/wiki/Santa_Clara_River_(Utah)
Plans for Future CMaP Activities	Instruct students in creating a ESRI Story Map from the data gathered throughout the year. Publish at least half of the geocaching sites for data collection publicly and online for world-wide access. Current barriers and concerns are that materials, supplies, data logs, etc may be stolen. Problem solving to these barriers would need to be addressed before the sites could be launched online.

Optional:
-Lesson Plans
-Student Artifacts
-Publicity