CMaP PROJECT

Project Title: 2010: JORDAN RIVER WATER QUALITY
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Class: UEN CMaP 2010

Project Description	Tenth Grade Biology Class: To map sampling sites, and graph water quality analysis values for students to analyze changes in water quality from 2005 to 2010 along the Jordan river between 4800 South and 123000 South. Students will obtain and analyze three samples of water from at least three of the following locations: 4800 South, 5400 South, 7800 South and 12300 South. Using a GPS, students will record waypoints for each of the samples taken. Using water testing kits students will test the following values: levels of dissolved oxygen, phosphorous, nitrogen, pH, turbidity, and temperature. Next students using Arcview will select a map, overlay appropriate imagery, import GPS waypoint data, and produce a graphic depicting 2010 water sampling sites along the Jordan River with a graph displaying the various water quality values.
Community Issue or Problem Selected -How project evolved?	The Jordan River was identified as polluted in 1978 and a goal to clean it up by 2010 has been formed. The purpose of the above project is to introduce students to water quality analysis as part of an overall ecology unit. Ideally students will collect samples from points identified above and produce a comparison graph of specific water values to demonstrate changes from 2005 data (to be supplied to the students) to illustrate changes in values (if there are any) and determine if a significant improvement of water quality has been achieved.
Community Partner(s)	Utah State University Water Quality Extension Jordan River Conservancy
Project Objectives	Students will learn: ☐ proper water sampling techniques and an understanding of water value implications ☐ An introduction to water quality and its effect on neighboring habitats and ecosystems ☐ How to obtain waypoints on a GPS ☐ An overview of ARCVIEW and mapping possibilities Recording observations on a data table, graphing, and charting of data to demonstrate relevance
Utah Core Standards/Objectives	ILO: **1. Use Science Process and Thinking Skills** a. Observe objects, events and patterns and record both qualitative and quantitative information. b. Use comparisons to help understand observations and phenomena. c. Evaluate, sort, and sequence data according to given criteria. d. Select and use appropriate technological instruments to collect and analyze data. e. Plan and conduct experiments in which students may:

	• Identify a problem. • Formulate research questions and hypotheses. • Predict results of investigations based upon prior data. • Identify variables and describe the relationships between them. • Plan procedures to control independent variables. • Collect data on the dependent variable(s). • Select the appropriate format (e.g., graph, chart, diagram) and use it to summarize the data obtained. • Analyze data, check it for accuracy and construct reasonable conclusions. • Prepare written and oral reports of investigations. STD 1: **Objective 2:** Explain relationships between matter cycles and organisms. a. **Objective 2:** Explain relationships between matter cycles and organisms. b. Use diagrams to trace the movement of matter through a cycle (i.e., carbon, oxygen, nitrogen, water) in a variety of biological communities and ecosystems. c. Explain how water is a limiting factor in various ecosystems. d. Evaluate the impact of personal choices in relation to the cycling of matter within an ecosystem (e.g., impact of automobiles on the carbon cycle, impact on landfills of processed and packaged foods). **Objective 3:** Describe how interactions among organisms and their environment help shape ecosystems. a. Use data to interpret interactions among biotic and abiotic factors (e.g., pH, temperature, precipitation, populations, diversity) within an ecosystem. b. Investigate an ecosystem using methods of science to gather quantitative and qualitative data that describe the ecosystem in detail. c. Research and evaluate local and global practices that affect ecosystems.
Essential Question(s) -Spatial Issue	How do nutrients such as oxygen, nitrogen and carbon cycle through an aquatic ecosystem? What impact does human activity in and around a specific ecosystem influence these nutrient cycles?
Assessments (rubrics, scoring guides)	Assessment will be formative and summative in nature – with individual observations as students collect data and produce their graphs and mapping products. A summative evaluation will be conducted on each student's finished product evaluated against a basic map elements checklist rubric.
Project Products	Basic Map depicting all items on the rubric, and a one-page write up of the significance of the results
Project Timeline (include a step by step Procedures)	Work with technology or earth science instructor to see if GPS or ArcMap software may be covered in either of their courses. If not, this will have to be a end of year (post CRT) project. Week One: Overview on GPS and basic ArcMap Software familiarity Week Two and Three: Field trip to obtain water samples and test various water quality values. Production of labeled and annotated graphic with embedded graph illustrating the student's data and other rubric items. One page analysis of results

Resources Needed	Three or four GPS receivers, digital cameras, laptops with ArcMap software installed, two to three water testing kits (check USU Water Quality Extension for some loaner kits)
Skills Required	Basic computer skills, attention to detail, recording and graphing data
Project Team Member Roles	**Teacher(s): Biology, Computer Tech and possibly Earth Science** **Students: 10th grade Biology Students** **Partner(s): USU Water Quality Extension**
Project Evaluation	Completed by teachers involved with student feedback and perhaps community partners
Project Bibliography	None
Plans for Future CMaP Activities	A variation of the environmental science aspect of the above project with a focus perhaps on plant ecology (trees/shrubs) or maybe abiotic influences on biotic populations, etc., within the immediate community of the school.