

Project Planning Form – Local Water Resource Analysis

Begin with the End in Mind

- Water distribution and cycling on Earth
- Human use of and impact on water
- Colorado distribution of surface and subsurface water supplies, related to population
- Local County water sources and population impact

Identify the content standards that students will learn in this project

Colorado Earth Science Content Standards – High School: There are costs, benefits, and consequences of exploration, development, and consumption of renewable and nonrenewable resources.

Evidence Outcomes – Students can:

- a. Develop, communicate, and justify an evidence-based scientific explanation regarding the costs and benefits of exploration, development, and consumption of renewable and nonrenewable resources
- b. Evaluate positive and negative impacts on the geosphere, atmosphere, hydrosphere, and biosphere in regards to resource use
- c. Create a plan to reduce environmental impacts due to resource consumption
- d. Analyze and interpret data about the effect of resource consumption and development on resource reserves to draw conclusions about sustainable use

National Science Education Standards – Science in Personal and Social

Perspectives: Content Standard F, grades 9-12, Specifically:

- a. Populations can reach limits to growth. Carrying capacity is the maximum number of individuals that can be supported in a given environment. The limitation is not the availability of space, but the number of people in relation to resources and the capacity of Earth systems to support human beings.
- b. Human populations use resources in the environment in order to maintain and improve their existence. Natural resources have been and will continue to be used to maintain human populations.
- c. The earth does not have infinite resources; increasing human consumption places severe stress on the natural processes that renew some resources, and it depletes those resources that cannot be renewed.
- d. Natural ecosystems provide an array of basic processes that affect humans. Those processes include maintenance of the quality of the atmosphere, generation of soils,

control of the hydrologic cycle, disposal of wastes, and recycling of nutrients. Humans are changing many of these basic processes, and the changes may be detrimental to humans.

Craft the Driving Question

Where does your water come from, how is it used, and can current population growth trends continue while maintaining a sustainable water supply?

Performance Objectives/Targets-

Early:

By modeling water distribution on Earth and graphing the results, students will illustrate how a finite water supply on Earth is distributed Among different sources (graph and summary statement)

By following the many routes of a water molecule through a complex branching water cycle (Hydro), students will organize the various sources and sinks of water in the cycle and create a schematic (poster, graphic, Inspiration web) of the sources and sinks

Through Internet research, students will evaluate the many human uses of water and the possible disruptions of water availability or quality that result from each use (written document, poster, or PowerPoint)

During:

Using GIS, students will calculate surface water availability per capita in the state of Colorado and analyze the visualization. Based on this analysis, they will assess possible conflicts due to different human uses

for the water and availability throughout the state. (Map of surface water riverflow data; map of population; map of land use; map of surface water per person; written document, poster, or powerpoint for analysis summary)

End:

Through their research and analysis, students will determine the source(s) and uses of their local water supply. Based on understanding of current population growth trends in the area, they will compile possible threats to their water quality and quantity and propose community action to protect a sustainable water supply.

Plan the Assessment

Step 1: Define the products and artifacts for the project:

Early in the Project:

Water Sources – Graph and Summary Statement comparing predicted and actual % of total water stored in different water sources.

Water Cycle- Inspiration Water Web detailing sources and sinks in complex water cycle

Water use and population impacts – Option: Essay, Poster, Powerpoint

During the Project:

GIS Products – 3 Layouts detailing water availability, population, and water availability per person – Option: Poster or Powerpoint

End of Project:

Presentation of recommendation to the community – Visual Display and Oral Presentation, including source(s) of local water, uses of local water, local population trends, threats to water supplies, proposal for community action to protect a sustainable water supply.

Map the Project

Product: PowerPoint or Poster, including GIS layouts, summary compilations, recommendations

Knowledge and Skills Needed	Already	Before	During
Know water distribution on Earth		X	
Know complex water cycle		X	
Have Internet research skills	X		
Know ArcMap skills		X	X
• Add data		X	X
• Perform math operation on data		X	X
• Selection criteria		X	X
• Display decisions		X	X
• Produce layouts		X	X
Know local water source(s) and population			X
Presentation skills	X		

Map the Project:

Week 1	Where is the water activity	Hydro Water Cycle Webbing Activity	Research Water Use and Population Impacts	
Week 2	GIS-Introduction using state riverflow data and population as context	Adding data, basic operations, math operations	Selection and display options, Layouts	Form groups Set project expectations
Week 3	Research local water sources, use, population growth statistics	Group work on final project	Group work on final project	Presentations- Gallery tour (Peer and others review)

Rubric Template:

Component	Level 0	Level 1	Level 2
Claim- An assertion or conclusion that answers the original question.	Does not make a claim, or makes an inaccurate claim.	Makes an accurate but incomplete claim.	Makes an accurate and complete claim.
Evidence- Scientific data that supports the claim. The data needs to be appropriate and sufficient to support the claim.	Does not provide evidence, or only provides inappropriate evidence (Evidence that does not support the claim).	Provides appropriate, but insufficient evidence to support claim. May include some inappropriate evidence.	Provides appropriate and sufficient evidence to support the claim.
Reasoning- A justification that links the claim and evidence and shows why the data counts as evidence to support the claim by using appropriate and sufficient scientific principles.	Does not provide reasoning, or only provides reasoning that does not link evidence to claim.	Provides reasoning that links the claim and evidence. Repeats the evidence and/or includes some scientific principles, but not sufficient.	Provides reasoning that links evidence to claim. Includes appropriate and sufficient scientific principles.

Plan the Assessment:

Step 2: State the criteria for exemplary performance for each product:

<p>Product: Graph of Global Water Distribution</p> <p>Criteria: Using scoring rubric: Data correct and complete Axes labeled and scaled correctly Quality Criteria (neat, color-coded)</p>
<p>Product: Water Web or Graphic</p> <p>Criteria: Rich display of sources and sinks , specify # of each required Quality Criteria (neat, pleasing) Demonstrates complexity of cycle (vs. simple single cycle)</p>
<p>Product: Poster/PowerPoint</p> <p>Criteria: Specify x # human uses, with matching impacts Extension into specific uses/impacts of local water Summary based on evidence gathered Source documentation and references (#) Quality Criteria</p>
<p>Product: GIS Products Presented in Poster/PowerPoint</p> <p>Criteria: 4 layouts Quality Criteria: correct, well-organized, visually pleasing Description of potential conflicts and consequences # based on data and analysis Quality Criteria</p>
<p>Product: Poster or PowerPoint or.....</p> <p>Criteria: Content: Correct results of research Water sources ID'd Human Uses ID'd source documentation and references (#) Population Growth Projections Description of threats to quality and quantity # based on data and analysis GIS Visualization and Presentation</p>

Layout(s) including required data

Display of Summary Points

#

based on data and analysis

Proposal for Community Action

#

based on data and analysis

Presentation Quality Criteria