Analyzing data to minimize land use impacts

Focus question	How can we utilize soil, water, and land use data to make land use decisions?
Vocabulary	Best management practices, conservation tillage, crop nutrient management, pest management, conservation buffers

Humans have made use of land and water ecosystems in order to efficiently plant and raise food for consumption. In the thousands of years that humans have practiced agriculture, many advances in technology have improved yield, nutrition, and flavor in foods that are produced. Farming is becoming a high tech and high talent industry, requiring fewer individuals on the farm and a growing number of individuals off the farm to support food production. As of 2021, 27% of the world labor force was employed in agriculture, with only 1–2% of the United States labor force actively engaged on the farm. Several ag-related careers gather data to help farmers better understand the health of the soil and water ecosystems on their land.

This lesson utilizes sample data such as farmers would use to compare to data you have collected from local ecosystems on water quality, soil texture, nutrients, and land use in previous lessons.

Materials

- Macroinvertebrate cards
- Water test cards
- Water test reference cards
- Soil texture cards
- Soil nutrient test cards
- Soil nutrient test reference cards
- Land use cards

Procedure

Analyze and interpret the data cards. Each card is representative of one aspect of water quality, soil texture, soil quality, or land use. Place the test results in the charts below.

Water quality rating total index value

	Excellent (> 22)	Good (17–22)	Fair (11–16)	Poor (< 11)
Score				

Water quality physical and chemical test

Test factor	Result	Rank	Score
Temperature	° C	N/A	N/A
Turbidity	0 JTU > 0 to 40 JTU > 40 to 100 JTU > 100 JTU	4 (excellent) 3 (good) 2 (fair) 1 (poor)	
pH	4 5 6 7 8 9 10	1 (poor) 1 (poor) 3 (good) 4 (excellent) 3 (good) 1 (poor) 1 (poor)	
Dissolved Oxygen (DO)	91–110% 71–90% 51–70% < 50%	4 (excellent) 3 (good) 2 (fair) 1 (poor)	
Nitrate	5 ppm 20 ppm 40 pm	2 (fair) 1 (poor) 1 (poor)	
Phosphate	1 ppm 2 ppm 4 ppm	4 (excellent) 3 (good) 2 (fair)	

Soil texture

Soil particle	Particle percentage	Soil type
Sand		
Silt		
Clay		

Soil nutrient test

Test	Result
Nitrogen	
Phosphorus	
Potassium	
pH	

Reflection

Create an explanation for the current state of each data card that you are asked to interpret. Did the water/soil data cards correspond to the type of land use represented? Look at your group's recorded information above. Reflect on the following questions while creating your explanation.

1. How did your data cards compare? Did they demonstrate similar results or different results?

2. Did any particular group of data stand out? If so, why do you think this set of data was different from the rest?

3. How do these different ecosystems interact with each other or potentially change throughout the year? For example, water temperature has a direct impact on the percent saturation of dissolved oxygen. How could the climate impact the biodiversity of the local flora and fauna if the percent saturation of DO changes?

4. How can human impact alter established ecosystems?

5. Design a possible solution to improve the quality of the ecosystem and/or land use card in each data card set your group analyzed.

Rubric for self-assessment

Skill	Yes	No	Unsure
I can identify macroinvertebrates and utilize the biotic index to determine water quality.			
I can interpret chemical and physical water data to assess water quality.			
I can interpret soil texture volume data on the soil triangle to determine soil texture.			
I can interpret soil nutrient data and make recommendations for amending soil nutrients.			
I can design solutions to improve current land use impacts on water and soil quality.			