Data: Read it, Interpret it, Use it
Karen Guerrero

Time: 9 Mini lessons of 10-15 minutes or 2 full class periods (50min-1hr)

Grade Level: 6th - 9th

Background: In research, students must be able to interpret information from a variety of resources. They then must be able to report that information in a manner that effectively portrays the information found. This module uses a variety of maps, graphs, charts, and timelines to present information from the Agrarian Landscapes in Transition locations across the United States. These maps and charts use real data from real research being conducted today. Students will learn about biomes and agricultural changes while practicing their skills needed to reach standards in science, social studies and math.

Objectives:
Students will be able to:
1. Use maps, graphs, charts, timelines and photographs to gather data
2. Interpret data from maps, graphs, charts, timelines and photographs
3. Use data to construct maps, graphs and charts
4. Develop questions that can be answered by historical and geographical study

Standards
United States Social Studies Standards
Strand 3: People, Places, and Environments
- Today’s social, cultural, economic, and civic demands on individuals mean that students will need the knowledge, skills, and understanding to ask and answer questions such as: Where are things located? Why are they located where they are? What patterns are reflected in the groupings of things? What do we mean by region? How do landforms change? What implications do these changes have for people?
- Middle school students should relate their personal experiences to happenings in other environmental contexts. Appropriate experiences will encourage increasingly abstract thought as students use data and apply skills in analyzing human behavior in relation to its physical and cultural environment.

Arizona State Social Studies Standards
Strand 1: U.S. History
- Use the following to interpret historical data: Timelines, graphs, charts
- Construct charts and graphs using historical data
- Interpret historical data displayed in graphs, tables and charts
- Develop questions that can be answered by historical study

Strand 4: Geography
- Interpret information from a variety of maps
- Construct maps, charts and graphs to display geographic information
- Identify purposes of and differences among maps, charts aerial photographs and satellite images

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Interpret maps, charts, and geographic databases using geographic information
Interpret thematic maps, graphs and charts depicting various aspects of the United States regions
Identify regions using a variety of criteria: climate, landforms, culture, vegetation
Identify common characteristics of contemporary and historical regions on the basis of climate, landforms, ecosystems, and culture.
Describe the factors that cause regions and places to change
Analyze the effects of settlement on places
Describe the intended and unintended consequences of human modification on the environment

Arizona State Math Standards
Strand 2: Data Analysis
Interpret data displays including histograms, circle graphs, line graphs and bar graphs
Construct a bar graph, histogram, line graph and circle graph with appropriate labels and title from organized data
Organize collected data into an appropriate graphical representation

Advanced Preparation: None

Materials: Copies of “Evaluating Maps, Charts and Graphs" worksheets for each student, rulers, calculators, colored pencils.

Suggested Procedure:
This lesson should be done in conjunction with math, science or social studies lessons on biomes, historical changes in America, graphing, or data collections. Each page can be done as a mini lesson to introduce or practice data collection and analysis, as a homework assignment, as testing preparation or as an evaluation tool. Or two days can be spent reviewing or evaluating students on interpreting data from graphs and constructing graphs from data.

Evaluation
Have students share their answers, predictions and maps/graphs they created. Have students switch packets and answer each other’s questions using the maps, graphs, charts and photographs.

Extensions
Students can research the agricultural history of their own state, collect data and present their findings using charts, maps, graphs and timelines.

Websites
Case Studies from all six locations
http://ces.asu.edu/AGTRANS/products.htm
Game: Land Use Changes
http://capltter.asu.edu/explorers/protocol/landuse/intro.html
Schoolyard Lter Site
http://schoolyard.lternet.edu/

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1. List what biomes are found in each of the following states:
   A. Arizona:____________________
   B. Colorado:___________________
   C. Kansas:_____________________
   D. North Carolina:_______________
   E. Massachusetts:_______________
   F. Michigan:___________________

2. This bar graph shows the average precipitation in six major biomes. Write an appropriate title for this graph:
   ____________________________________________

3. In Michigan, what is the average precipitation (approximate) during the summer months (June, July, August)?
   ________________

4. In comparing the precipitation and temperatures, summarize what visitors might expect in the Winter versus the summer in Michigan.
   ________________
   ________________
   ________________
   ________________
1. Evaluate the maps and graph of Coweeta in North Carolina. What happened to the forest land versus the cleared land? What is happening with the population? Summarize your findings based on the data provided.

2. Cattle is a huge part of agriculture in Kansas. In 1880 cattle numbers ranged from 426 to 26,208 per area (with some areas missing data). In 2000 numbers increased from 3000 to 285,000 cattle per area. Evaluate the data provided through these maps. Determine whether you think the maps are easy to read or not. Summarize why you believe the maps are easy to read or what improvements could be made to make the maps more readable.

3. Evaluate the data and construct a map demonstrating your prediction for the amount of cattle that will be found in Kansas in 2080. Summarize how you determined the numbers.
Coweeta, North Carolina: Number and Size of Farms

1. Both of these graphs show data on farm size and number of farms over time in North Carolina. Summarize what trends you notice.

_________________________________
_________________________________
_________________________________
_________________________________
_________________________________

2. Which chart is easiest to read and why?

_________________________________
_________________________________
_________________________________
_________________________________

3. This table shows the agriculture commodities adopted by the Cherokee in North Carolina. Construct a chart/graph that flows and is easier to read.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Taxonomy</th>
<th>Adopted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>Malus punicana</td>
<td>~1725</td>
</tr>
<tr>
<td>Barley</td>
<td>Hordeum vulgareae</td>
<td>~1830</td>
</tr>
<tr>
<td>Chicken</td>
<td>Gallus gallus</td>
<td>~1725</td>
</tr>
<tr>
<td>Cotton</td>
<td>Gossypium herbaceum</td>
<td>~1830</td>
</tr>
<tr>
<td>Cow</td>
<td>Bos taurus</td>
<td>~1778</td>
</tr>
<tr>
<td>Fig</td>
<td>Ficus carica</td>
<td>~1725</td>
</tr>
<tr>
<td>Horse</td>
<td>Equus caballus</td>
<td>~1740</td>
</tr>
<tr>
<td>Oats</td>
<td>Avena sativa</td>
<td>~1820</td>
</tr>
<tr>
<td>Onions</td>
<td>Allium sativum</td>
<td>~1830</td>
</tr>
<tr>
<td>Peach</td>
<td>Prunus persica</td>
<td>~1885</td>
</tr>
<tr>
<td>Pear</td>
<td>Pyrus communis</td>
<td>~1725</td>
</tr>
<tr>
<td>Pig</td>
<td>Sus scrofa</td>
<td>~1740</td>
</tr>
<tr>
<td>Pomegranate</td>
<td>Punica granatum</td>
<td>~1725</td>
</tr>
<tr>
<td>Irish Potato</td>
<td>Solanum tuberosum</td>
<td>~1885</td>
</tr>
<tr>
<td>Rice</td>
<td>Oryza sativa</td>
<td>~1775</td>
</tr>
<tr>
<td>Rye</td>
<td>Secale cereale</td>
<td>~1830</td>
</tr>
<tr>
<td>Sorghum</td>
<td>Sorghum drumamondi</td>
<td>~1830</td>
</tr>
<tr>
<td>Sweet Potato</td>
<td>Ipomoea batatas</td>
<td>~1830</td>
</tr>
<tr>
<td>Turnip</td>
<td>Brassica napusae</td>
<td>~1830</td>
</tr>
<tr>
<td>Watercress</td>
<td>Nasturtium officinale</td>
<td>~1885</td>
</tr>
<tr>
<td>Wheat</td>
<td>Triticum aestivum</td>
<td>~1830</td>
</tr>
</tbody>
</table>
1. Look at the circle graphs comparing fruit crops in Michigan in 1904 and 1997. What percentages of apples, peaches, grapes and cherries are grown in 1904 versus 1997? What changes do you notice in types of fruits grown? Create a list of changes below. Include approximate percentages in your list.

2. In 1880 the primary commodities in Michigan were Wheat, Hay, Corn and Oats. Create a circle graph using the data below. Be sure to include a key.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>1,009,832</td>
</tr>
<tr>
<td>Hay</td>
<td>542,814</td>
</tr>
<tr>
<td>Corn</td>
<td>530,247</td>
</tr>
<tr>
<td>Oats</td>
<td>216,776</td>
</tr>
</tbody>
</table>

3. In 1940 the primary commodities changed. Label the graph to the right with approximate Percentages. What changes do you notice between 1880 and 1940? Summarize the changes below.

   ______________________________
   ______________________________
   ______________________________
   ______________________________
   ______________________________
1. Look at the GIS maps of Petersham in Massachusetts in 1830 and in 1999. What is the most significant change that occurred?

___________________________________________________________________

2. Looking at the previous maps of Arizona, why do you think the natural land (desert) was being taken away in Arizona and the natural land (forest) is continuing to grow in Massachusetts?

___________________________________________________________________

___________________________________________________________________

___________________________________________________________________

3. Based on the pictures found at: [http://harvardforest.fas.harvard.edu/museum/landscape.html](http://harvardforest.fas.harvard.edu/museum/landscape.html) and the GIS maps above, summarize the changes that have occurred in Massachusetts.

___________________________________________________________________

___________________________________________________________________

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1. Above you see a series of pictures displaying central Arizona’s land use over time. Write a statement describing what happened to agriculture and desert land as people moved in.

________________________________________________________________
________________________________________________________________
________________________________________________________________
________________________________________________________________

1912 1934 1955 1975 1995

<table>
<thead>
<tr>
<th></th>
<th>1912</th>
<th>1934</th>
<th>1955</th>
<th>1975</th>
<th>1995</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>253,422</td>
<td>442,624</td>
<td>391,001</td>
<td>453,739</td>
<td>319,371</td>
</tr>
<tr>
<td>Urban</td>
<td>4,940</td>
<td>11,609</td>
<td>75,582</td>
<td>185,497</td>
<td>508,326</td>
</tr>
<tr>
<td>Desert</td>
<td>2,570,282</td>
<td>2,359,097</td>
<td>2,327,728</td>
<td>2,096,042</td>
<td>1,876,953</td>
</tr>
<tr>
<td>Recreation</td>
<td>0</td>
<td>15,067</td>
<td>34,333</td>
<td>93,366</td>
<td>123,994</td>
</tr>
</tbody>
</table>

2. Create a line or bar graph displaying the data above.

3. Based on the chart and maps above, what do you think Central Arizona will be like in 20 years? 50 years?
“The introduction, spread, and abandonment of agriculture represents the most pervasive modification of the Earth’s terrestrial environment during the past 10,000 years”. This statement summarizes the changes seen in the maps, photos, graphs, and timeline you have read in this packet. People have altered their environment by moving to new places, farming for food, and building homes, towns and cities. The question is, have we improved the place we live? Write an essay stating your opinion on whether our changing our environment has improved where we live or has made changes that isn’t for the best. Include at least three reasons and examples to support your opinion.

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**Agricultural Timeline**

*Developed by researchers trying to find patterns among the six different areas being studied.*

<table>
<thead>
<tr>
<th>Year</th>
<th>MA</th>
<th>CO</th>
<th>AZ</th>
<th>NC</th>
<th>MI</th>
<th>KS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 AD</td>
<td>Pre-colonial Horticulture</td>
<td>Colonial Agrarian</td>
<td>Horse and Gun Hunt</td>
<td>Horticulture</td>
<td>Pedestrian Hunt</td>
<td>Horse and Gun Hunt</td>
</tr>
<tr>
<td>500</td>
<td>Colonial Agrarian</td>
<td>Commercial Agr</td>
<td>National economy</td>
<td>Corn, Beans, Squash</td>
<td>Pedestrian Hunt</td>
<td>Horse and Gun Hunt</td>
</tr>
<tr>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td>European Crops</td>
<td></td>
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<td>1300</td>
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<td>1500</td>
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<td>1930</td>
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<td>1940</td>
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<td>1980</td>
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<td>1990</td>
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<td>2000</td>
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</tbody>
</table>

1. In reviewing the timeline above, what states record the earliest known horticulture?  
A. Colorado and Massachusetts  
B. Massachusetts and North Carolina  
C. North Carolina and Michigan  
D. Michigan and Kansas

2. In Arizona the Hohokam were very involved in agriculture before a time lapse of more than 500 years when modern European agricultural techniques were used. What years were the Hohokam active in Arizona?  
A. 500 A.D. to 1600 A.D.  
B. 500 A.D. to 1300 A.D.  
C. 1300 A.D. to 1600 A.D.  
D. 1300 A.D. to 1870 A.D.

3. By the 1850’s four of the six states were using European techniques and crop choices. According to the timeline, what western states were on the brink of beginning their agricultural development?  
A. California and Arizona  
B. Arizona and New Mexico  
C. Colorado and Arizona  
D. Washington and Colorado

4. The Golden Years, a time when agriculture was booming and growing and very successful varied from state to state. What state was the first to be successful with commercial agriculture during this time?  
A. North Carolina  
B. Kansas  
C. Arizona  
D. Massachusetts

5. The Depression halted the Golden years and the years of intensification and specialization in many states. This same time period marked the Beginning of Agricultural decline. What decade changed agriculture’s future forever?  
A. 1920s  
B. 1940s  
C. 1960s  
D. 1980s

6. On a separate sheet of paper compare and contrast two state’s agricultural histories. Include dates and time periods as well as reasons why you think their histories vary.
This map shows six agricultural study areas across the United States: Central Arizona Phoenix - Arizona, Shortgrass Steppe - Colorado, Konza Prairie - Kansas, Kellogg – Michigan, Coweeta – North Carolina, and Harvard Forest – Massachusetts. Develop two questions per location that can be answered using the graphs, charts, tables, and maps from the previous pages. Record your answers on the back of this page.