Where is the Best Place to Locate a New Solar Power Plant? Teacher Guide

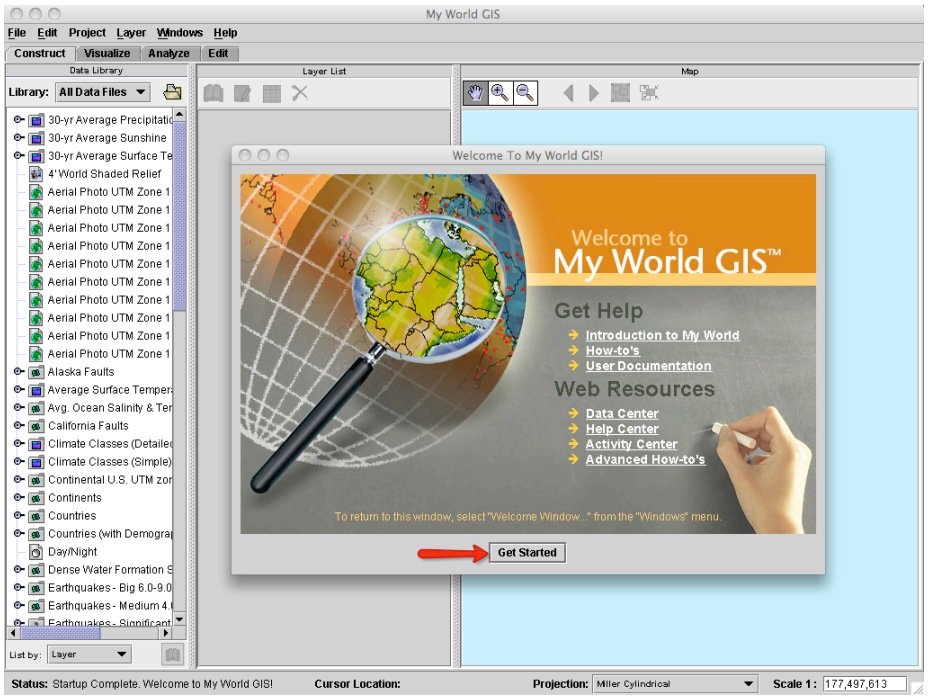
Solar energy comes from the sun. In this activity, students will use My World GIS to determine the best place to locate a new solar power plant. They will

1. Learn some basic features of My World GIS to visualize data and obtain information.
2. Analyze annual average sunshine data to determine good locations for solar plants.

Model the following procedural instructions with your students. It is recommended that you display your computer image at the front of the classroom.

Step 1: Basic Features of My World GIS

a. Click  in the dock to open My World GIS on your computer. The My World Window is displayed.



b. Click on **Get Started** to close the “Welcome To My World GIS” window (see arrow above).

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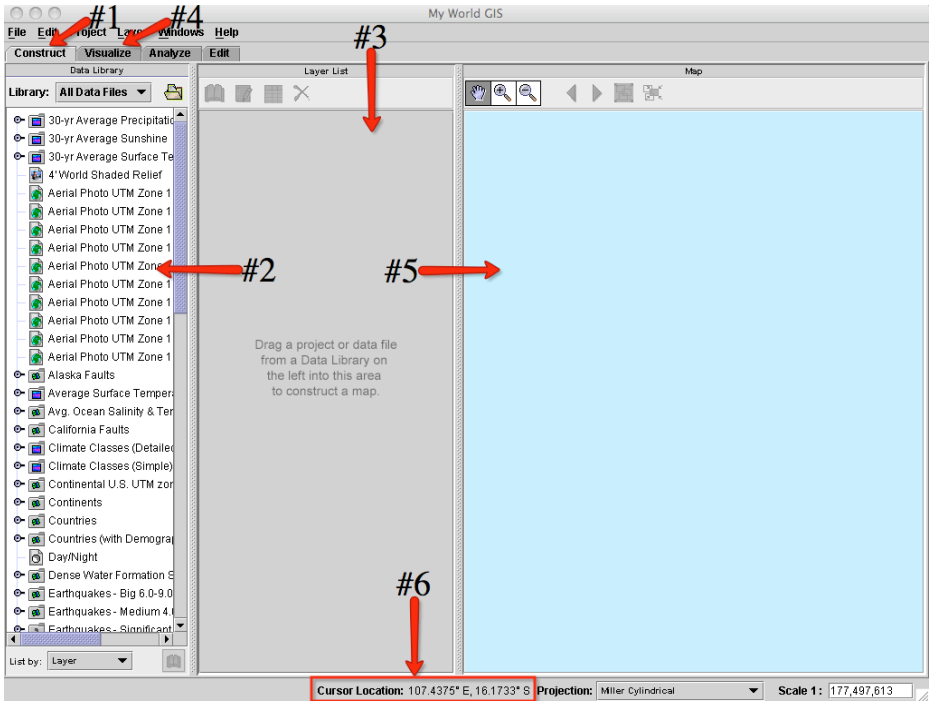


Note the following:

1. **Construct** mode (arrow #1) - On the left side of the My World Window, you will see a list of data files (arrow #2), called the **Data Library.**
   Data files are moved to the **Layer List** (arrow #3) to construct a map.

2. **Visualize** mode (arrow #4) - Used for looking at the map and customizing its appearance.

3. **Map** (arrow #5) – Area where layers are displayed in a map.

4. **Cursor Location** (arrow #6) – Displays the longitude and latitude of the cursor location.
   If the cursor is outside of the map area, it will display "Out of Range."

Step 2: Download data.

a. Open your Web browser. Go to **www.ei.lehigh.edu/learners/energy/**

b. Click on **Where is the Best Place to Locate a New Solar Power Plant?**

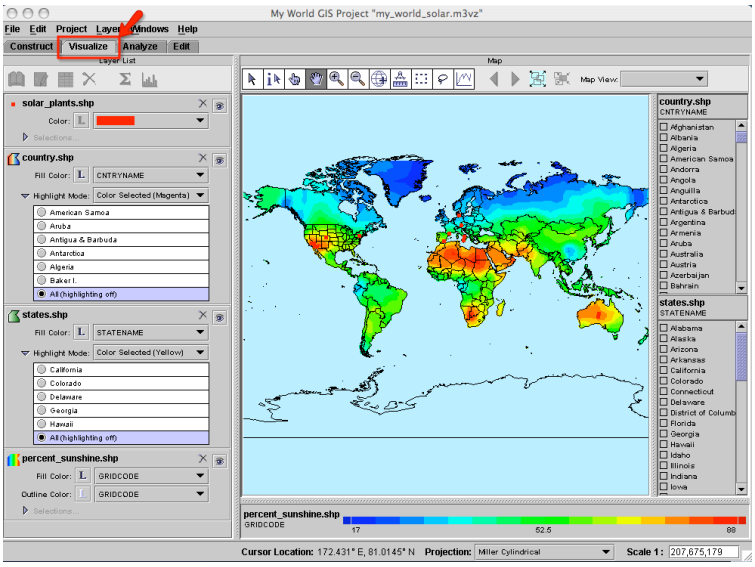
   This downloads the **my_world_solar.m3vz** file on to your desktop (see icon below)**.**

Step 3: Load data in My World GIS.

a. **Double click** on **my_world_solar.m3vz** icon to open the file in My World GIS.

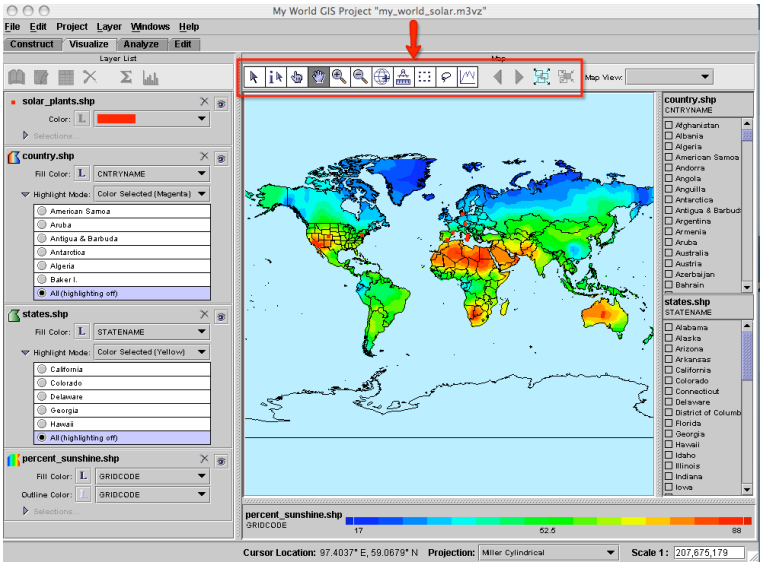
The window below should open on your computer. Check to make sure you are in the **visualize** mode (see arrow below).
You should notice that,

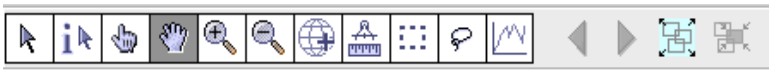
i. The **Data Library** is no longer displayed in the left panel.
ii. The **Layer List** has a list of layers and is now displayed in the left panel.
iii. The **Map** is displayed in the middle panel.
iv. A list of country names and state names is displayed in the right panel.



Step 4: Map Tools

You can **change the scale** of your map by using the **map tools** (see arrow below).





a. Click on the **Zoom In** tool  .
Click anywhere on the map.
Click two more times.
What happens to the map?
You should notice that the map displays a smaller area in more detail.

b. Click on the **Zoom To All** tool  .
What happens to the map?
You should notice that the map zooms out to display the entire world.

c. Click on the **Zoom In** tool  again. **Drag and draw** a small rectangle over any area on the map.
What happens to the map?

d. Click and on the **Move Map** tool  .
Click and drag the map the left.
Click and drag the map to the right.
Click and drag the map upward.
Click and drag the map downward.
What happens to the map?
You should notice that the map displays are re-centered at a new location.

e. Click on the **Zoom Out** tool  . Click two more times.
What happens to the map?
You should notice that the map displays a larger area.

f. Click on the **Zoom To All** tool  again.

g. Click on the **Pointer** tool  .
Click on the second layer, **country.shp** in the **Layer List**.
What happens when you click on this layer?
Note that the country names on the right side of the screen are highlighted.

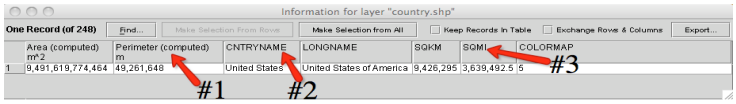
h. Click on the third layer **states.shp** in the **Layer List**. What happens when you click on this layer?
Note that the state names on the right side of the screen are highlighted.

i. Click on the bottom layer **percent_sunshine.shp** in the **Layer List**.
What happens when you click on this layer?
Note that the **color key** on the **bottom of the screen is highlighted**.
This data layer displays the **average percentage of sunshine** an area receives.

j. Click on the **country** layer to highlight it.

Click on the **Get Information** tool  .
Click on the United States of America on the map.
An **Information for layer "country.shp"** window appears with information about the USA as shown below.

Perimeter (computed) m (see arrow #1 below) displays the **perimeter** of the USA in meters. Remember perimeter is the distance around an area.
CNTRYNAME (see arrow #2 below) stands for **country name.**
SQMI (see arrow #3 below) displays the area of the United States in **square miles**.



Instruct students to click on any **two countries** on the map and complete the **Information for Countries Data Chart** on their investigation sheet.

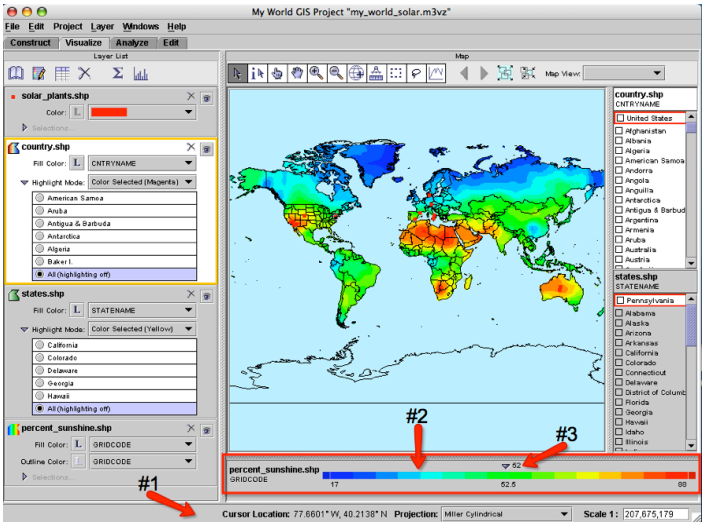
k. Close the **Information for layer "country.shp"** window when you finish.

Step 5: Get and analyze geographic positions and sunshine data of solar plants.

a. Using the pointer tool **place** your cursor over any location in the **United States of America. Do not move your cursor.**

b. Look at the **status bar** (arrow #1 below).
The **Cursor Location** displays two values.
The value that ends with **°W** is the **longitude** and the value that ends with **°N** is the **latitude**.
Above the **status bar**, you will see the colored **percent_sunshine.shp bar** that ranges from 17 to 88% (arrow #2).

The location in the diagram below displays **52** (arrow #3) on the **percent_sunshine.shp** bar. This means **that this location receives an average of 52% of sunshine during the day each year**.



Instruct students to use the My World GIS map to answer **questions 1 - 5** on their investigation sheet.

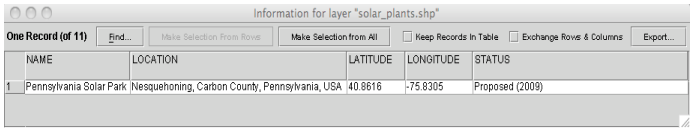
c. **Part 1:** Use the **Pointer** tool to click to select the **top layer in the Layer List.** This should be the **solar_plants** layer. Each **red dot** on the map is a solar plant location.

Use the **Zoom In tool** to enlarge the state of Pennsylvania.

Use the **Pointer tool** to **click and leave** your cursor on the **solar power plant location in Pennsylvania**. **(NOTE: Do not move your cursor. If you move your cursor, the latitude and longitude will change)**.

Instruct students to answer **question 6** on their investigation sheet.

Part 2: Use the **Get Information Tool** to click on the solar power plant that is located in Pennsylvania. A **Layer Information Window** will appear:

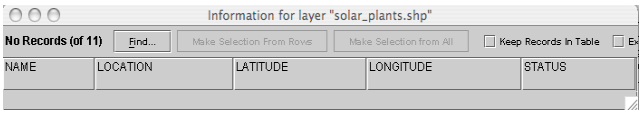


The **Layer Information Window** contains data abut a particular location.
For each power plant location, this window displays the **name of the solar plant**, the **country** it is located, the **geographic coordinates** of the power plant (**latitude** and **longitude**), and whether the power plant **exists** in the year 2009 or has been **proposed** to be built at that location.

Part 3: Use the **Get Information Tool** to click on the remaining 13 solar power plants that are located on your map.
Use the data from the **Layer Information Window** and the **percent_sunshine.shp** bar to complete the **Sunshine Data Chart** below. The Pennsylvania Solar Park solar plant is completed as an example.

Helpful hint: Click on the **Zoom To All** tool to see these.

NOTE: Be sure to show your students that they must click exactly on the solar power plant red dot symbol to get the **Layer Information Window** to appear. If they do not click exactly on the dot, they will get a **Layer Information Window** with **no data** displayed that looks like this:



Instruct students to answer question **7** on their investigation sheet. Instruct students to use the My World GIS map to complete the **Solar Power Plants Data Chart** on their investigation sheet.

Instruct students to use their Solar Power Plants Data Chart and the My World GIS map to answer **questions 8 – 15** on their investigation sheet.