

Carbon Projection Applet Worksheet



Adapted from the [Global Dilemma lesson plan](#) created by Jeanine Gelhaus

Go to the following website: <http://carboncycle.aos.wisc.edu/>

1. Look at the **TABS** across the top of the page. Use your prior knowledge and the information available from these TABS to answer the questions in this worksheet.



2. Click on the **APPLET** tab to access a climate model of carbon projections.



3. This is an interactive computer exercise where you can model future projections of CO₂ sources and sinks by dragging the green points on the top left graph to see what happens to CO₂ in the top right graph and the relative fluxes depicted in the bottom graphic. Be sure to view **BOTH** the bottom graphic *and* the 3 boxes in the **MIDDLE** of the page (sources, sinks, and controls). Click on each tab in the middle boxes and note the corresponding changes in the bottom graphic. The changes provide clues to help answer the questions in this worksheet. Before you go further you may want to click on the “help” tab for the following pointers:

How much CO₂ will the atmosphere contain?

You can't change the past (orange is historical data), but with this application, you can determine what atmospheric CO₂ will be in the future! Click on the dots to move the green projection lines in order to set each source and sink into the future!

Switch between each source and sink with the center buttons and "Reset" to return to default. Click "Run Projection" to let it go.

Your last projection will remain in the background for the purpose of comparison.

Scroll over the line graphs on either side for exact values.

QUESTIONS**RESPONSES (USE APPLET AND TABS TO FIND ANSWERS)**

<p>Look at the box in the middle of the applet. What are the words you find in the box under "Sources?" These "sources" contribute carbon to our atmosphere.</p>	
<p>Fossil Fuels are mentioned above as a "Source" of carbon.</p> <p>a. What are fossil fuels?</p> <p>b. How do fossil fuels form?</p> <p>c. How does carbon from fossil fuels end up in the atmosphere?</p>	<p>a.</p> <p>b.</p> <p>c.</p>
<p>LAND USE is an additional "source" of carbon. The applet shows a forest burning. What does a burning forest have to do with an increase (or source) of carbon in our atmosphere? HINT: click on "land use" tab at the top of the page to read more</p>	
<p>A Carbon "SINK" is the way that Earth can absorb and hold some of the carbon from the atmosphere.</p>	
<p>If "Ocean Uptake" is a SINK for carbon, where do you think some of the carbon is being absorbed to or held?</p>	

<p>What does “Land Uptake” mean? (HINT: use the TABS above to help). Where in the biosphere is some of the carbon absorbed and held?</p>	
--	--

4. Under the “SINKS” box you will find the “**Control**” box. Click on the Celsius button. Look at the graph on the right side of the page. You will see the axis (on the right hand side) change from Fahrenheit to Celsius. Now change it back to Fahrenheit.
5. Look at BOTH graphs. Fill in the table below.

	Graph on LEFT side of the page	Graph on the RIGHT side of the page
<p>What is the title of the graph?</p>		
<p>What information is found on the X axis?</p>		
<p>What information is found on the Y axis?</p>	<p><i>NOTE: The number on this axis is the amount of CARBON located in the atmosphere. PgC stands for Petagram. One PgC is equal to 1 gigaton or 1 billion tons.</i></p>	<p>Left Y axis</p> <p>Right Y axis</p>

6. Click on SOURCES: **FOSSIL FUELS** (middle box).
 MOVE the cursor over the left graph. (Don’t click on it). You will notice that the TOP line of the graph is highlighted. This shows you that you have activated the **FOSSIL FUELS** portion of that graph. Click on **LAND USE**. Again, move the cursor over the left graph. You will notice the second line on the graph has gotten darker to show you have activated that line. Now click on **OCEAN UPTAKE** and repeat this process. Finally click on **LAND UPTAKE**. By now you should have noticed that each time you click on a source or sink you activate that section of the graph.

7. Go back and click on **FOSSIL FUELS** again.
As you move the cursor directly over that activated line you will notice that a box will appear above the line showing both the year and the amount of carbon added to the atmosphere from this source.
8. How is the orange line section different from the green line section?
9. What does the word "Projected" mean?
10. Using the **FOSSIL FUEL** graph, answer the following questions:
 - a. How much carbon from fossil fuels was placed in the environment in 1971? _____
 - b. In what year do we find approximately 15 PgC? _____yr
11. Click on **LAND USE**. What is the amount of carbon added to the atmosphere from land use in 2010? _____PgC/yr
12. As you slide your cursor along this line, what happens to the amount of carbon due to land use from 2010 to 2080? Does it increase or decrease? _____
13. Click on **CARBON SINKS-OCEAN UPTAKE**.
How much carbon are the oceans projected to absorb by 2080? _____PgC/yr. This means it will take that amount OUT of the atmosphere and store it in the deep ocean. (*Ocean and Land lines run together. You can identify OCEAN uptake by the pop-up box*)
14. Notice the "ZERO" line.
What does it mean if the data is above that line? _____
What does it mean if the data is below that line? _____
15. Below the zero line you will see the **SINKS**. Move your cursor over the two lines below the zero line.
Circle the correct answer.
Which line represents the **OCEAN UPTAKE** line (top or bottom).
Which line represents the **LAND UPTAKE** line? (top or bottom)
16. Click on **SINKS: OCEAN UPTAKE**. Use your cursor and move over the graph line.
What is the projected carbon uptake by the land in 2020? _____
17. Click on **SINKS: LAND UPTAKE**: Use your cursor and move over the graph line.
What is the ACTUAL land uptake in 1990? _____
What is the PROJECTED land uptake in the year 2100? _____