

## 5.2: Grading Corn Ecosystem Products and Services Worksheet

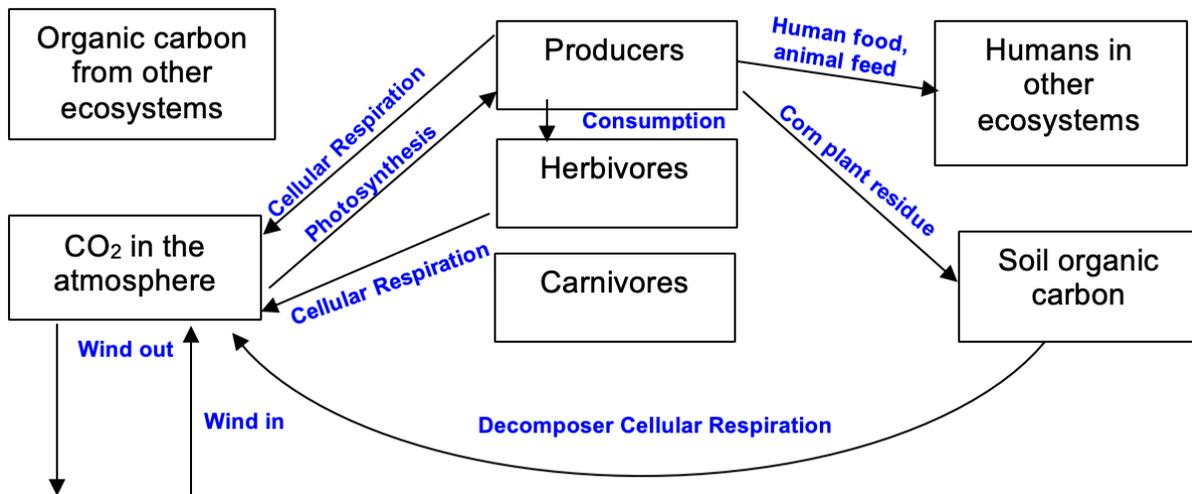
*This worksheet has “grading” in the title because at this point, students can be held accountable for correct answers. Level 4 (correct) responses to the questions are in **blue bold italics** below.*

*Red italics suggest ways to grade student responses by giving them points for correct or partially correct answers. There are 20 points total on this worksheet.*

Answer these questions based on the Corn Ecosystem Services Reading, then share what you have learned with people who have read about other ecosystems

### A. Carbon Fluxes in a Corn Ecosystem

1. The boxes below show the main carbon pools in (or connected with) a corn ecosystem. Draw and label arrows to show the carbon fluxes for each of the processes in the table for Question 2.



*1 point for each line and label; 9 points total*

2. Here are some processes that happen in a corn ecosystem. Describe how each process moves carbon from one pool to another.

<b>Process</b>	<b>How the Process Moves Carbon Between Pools</b>
The wind blows, carrying CO <sub>2</sub> into and out of the corn field.	<i>The wind blows carbon dioxide into and around the corn field where it is available for plants to use for photosynthesis. The wind also blows carbon dioxide produced by plant and animal cellular respiration out of the corn field and into other ecosystems.</i>
Deer eats corn from corn field	<i>When deer eat the corn, organic carbon stored in the corn is used by the deer as they do cellular respiration in their cells, moving carbon into the air as carbon dioxide.</i>

Corn grows	<i>Corn (the producer) moves inorganic carbon in the air (CO<sub>2</sub>) and store it in it's body for photosynthesis, which also releases oxygen into the air. The corn also release some CO<sub>2</sub> as a result of cellular respiration.</i>
Dead corn decomposes	<i>Dead corn decomposes, releasing the carbon back into the atmosphere or into the soil.</i>
Humans harvest corn and use it to feed cattle	<i>Organic carbon is exported from the system to cattle feed lots.</i>

*1 point for each section; 5 points total*

3. The wind blows through the corn ecosystem all year. If you could measure all the CO<sub>2</sub> in the wind blowing into the corn ecosystem and compare it with all the CO<sub>2</sub> in the wind blowing out of the corn ecosystem, what would you expect to find?

- a) There would be a little more CO<sub>2</sub> in the wind blowing in
- b) There would be a little more CO<sub>2</sub> in the wind blowing out
- c) *There would be just as much CO<sub>2</sub> in the wind blowing in and the wind blowing out***

Explain your answer.

*The corn's carbon inputs are equal to the amount of carbon outputs. The fluxes are mostly balanced. Specifically, the amount of carbon that is photosynthesized in a year in the corn field is balanced by the amount of carbon leaving the system as CO<sub>2</sub> or harvested grain.*

*1 point for correct force choice, 1 point for explanation; 2 points total*

## **B. Ecosystem Services in a Corn Ecosystem**

Explain the main way that a corn field provides materials and ecosystem services that are useful to humans.

*The main material a corn farm provides is food to feed humans and livestock, which is eventually meat that humans eat. If the land was abandoned, it would support other types of plants and wildlife. It would could potentially provide cleaner water with the reduction of fertilizer use.*

*1 point for explaining the materials a corn ecosystem provides*

## **C. Carbon in a Corn Ecosystem**

In a corn field ecosystem, how would you expect the amount of carbon dioxide in the air to change in the **winter**? The amount of carbon dioxide in the air around the corn field (choose one):

- a. **Would increase**
- b. Would decrease
- c. Would stay about the same

Explain your answer. What might cause the amount of CO<sub>2</sub> in the air around the corn field to change during the winter?

**Level 4 responses may suggest that when photosynthesis occurs, more carbon atoms move from carbon dioxide in the air to plants. When cellular respiration occurs, more carbon atoms move from living organisms to the air. During the winter the rate of photosynthesis decreases, and respiration either stays the same or decreases slightly. Since there are fewer carbon atoms entering plants compared to in the summer (and since atoms last forever), the overall amount of carbon dioxide in the atmosphere has to increase.**

*1 point for correctly answering forced choice; 1 point for correctly explaining how carbon dioxide fluxes in winter; 2 points total*

#### **D. Something interesting that you learned**

What is something interesting that you learned about a corn field ecosystem from your readings and discussion?

**Answers will vary.**

*1 point for a relevant and meaningful response.*