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| **Schoolyard Ecology: Carbon Dioxide Chambers** |

**Baltimore Ecosystem Study**

**Cary Institute of Ecosystem Studies**

**Towson University**

***Balance of photosynthesis and respiration***

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| **Source** |  | Alan Berkowitz, Bess Caplan, Sarah Haines, Tim Meyers, Trevor Shattuck. Cary Institute of Ecosystem Studies and Towson University. |
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| **Questions** |  | Are there differences in the CO2 levels in different areas of the school campus?  Does the amount of light affect the plant respiration and CO2 production rate?  Is there any correlation between temperature increase and cellular respiration/photosynthesis processes? |
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| **Overview** |  | Carbon plays a major role in the structure of life, the condition of the climate and the use of global energy. One main component of global carbon flows is that carbon flows into the atmosphere in the form of CO2 through respiration and that CO2 flows back out of the atmosphere through the process of photosynthesis.  By adjusting the rate of photosynthesis through the control of available sunlight to a semi-closed system, this study will lead students to a better understanding of that major component to the carbon cycle and how it balances with respiration. Students will generate data that leads them to a better understanding of this abstract concept as well as look at factors that influence both of these processes. |
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| **Materials** |  | * One to three CO2 Meters * A ten gallon aquarium for each CO2 Meter * Enough window or door screen to cover each aquarium three times. * Infrared filters (three gallon size Ziplock style bags filled partly with water) for each aquarium. |
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| **Procedure** |  | **Find a good location for the study.**   1. Find a grassy area that is well exposed to sunlight. (This study works best on a sunny day.) 2. Within that area, find three plots that are the size of the opening of the aquarium and as similar as possible with regards to the vegetation, soil and available sunlight.   ** Collecting Data.**   1. At each site, place a meter in the middle of the plot and turn it on. 2. Record the CO2 level and temperature. 3. Enclose the meter and the plot with the aquarium. 4. Immediately cover the entire aquarium with three layers of screen and put the infrared filter on top of it. 5. Wait five minutes and record the CO2 level and temperature reading on the meter and record. 6. Complete this process at each site with three layers of screen, two layers of screen, one layer of screen and no screens.   ** Analyzing data.**   1. The average change in CO2 levels can be graphed against the number of screens covering the aquarium. 2. The same can be done with the temperature. 3. The carbon change for each replicate can also be graphed against the temperature change for each replicate. 4. Discuss what causes the differences in carbon change as well as the differences in temperature change. 5. Determine what measurement (temperature or CO2 level) could be affected by or affecting photosynthesis and respiration within the system. |