

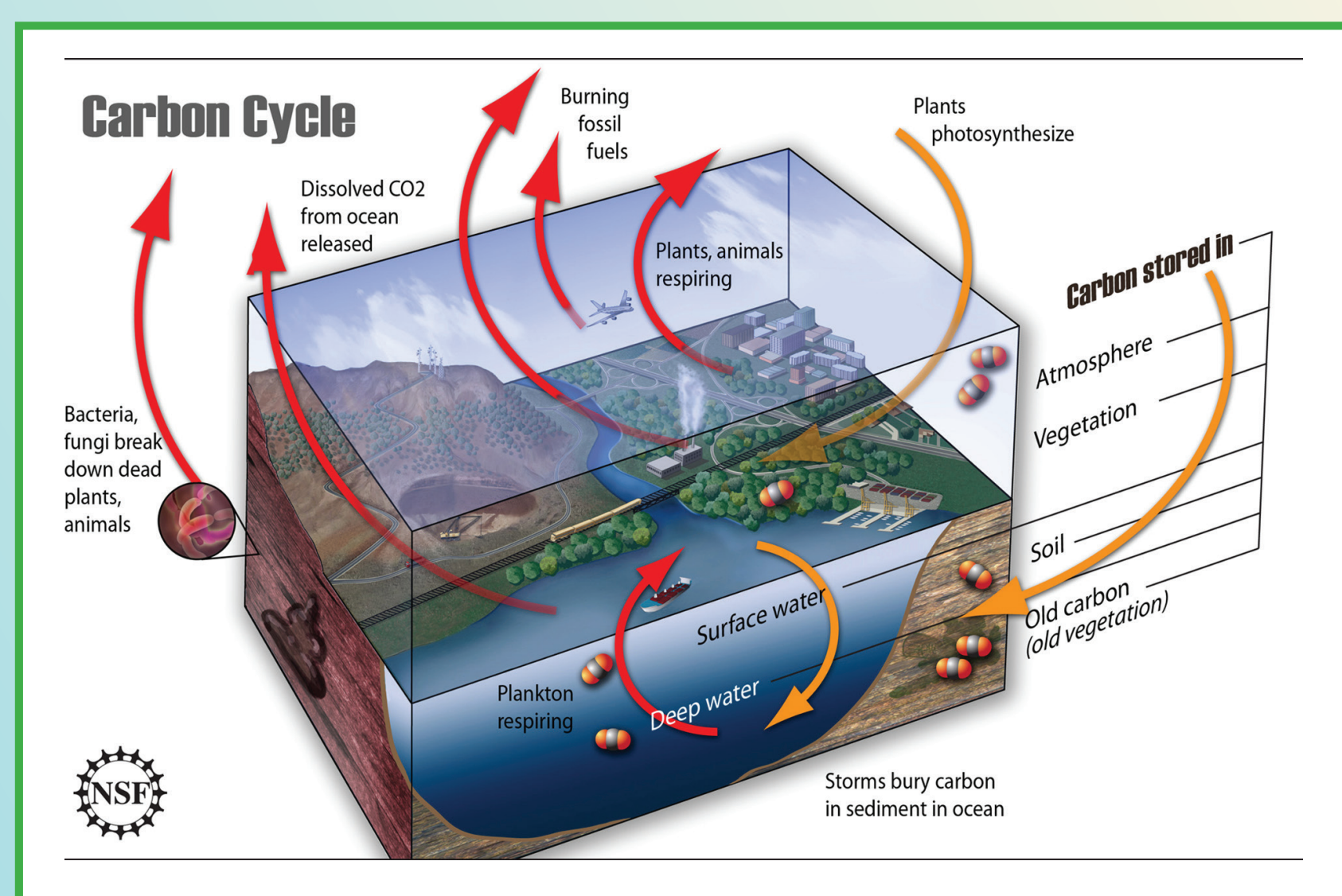
# Become a Citizen Scientist in Your Own Backyard!

## The Tea Bag Experiment

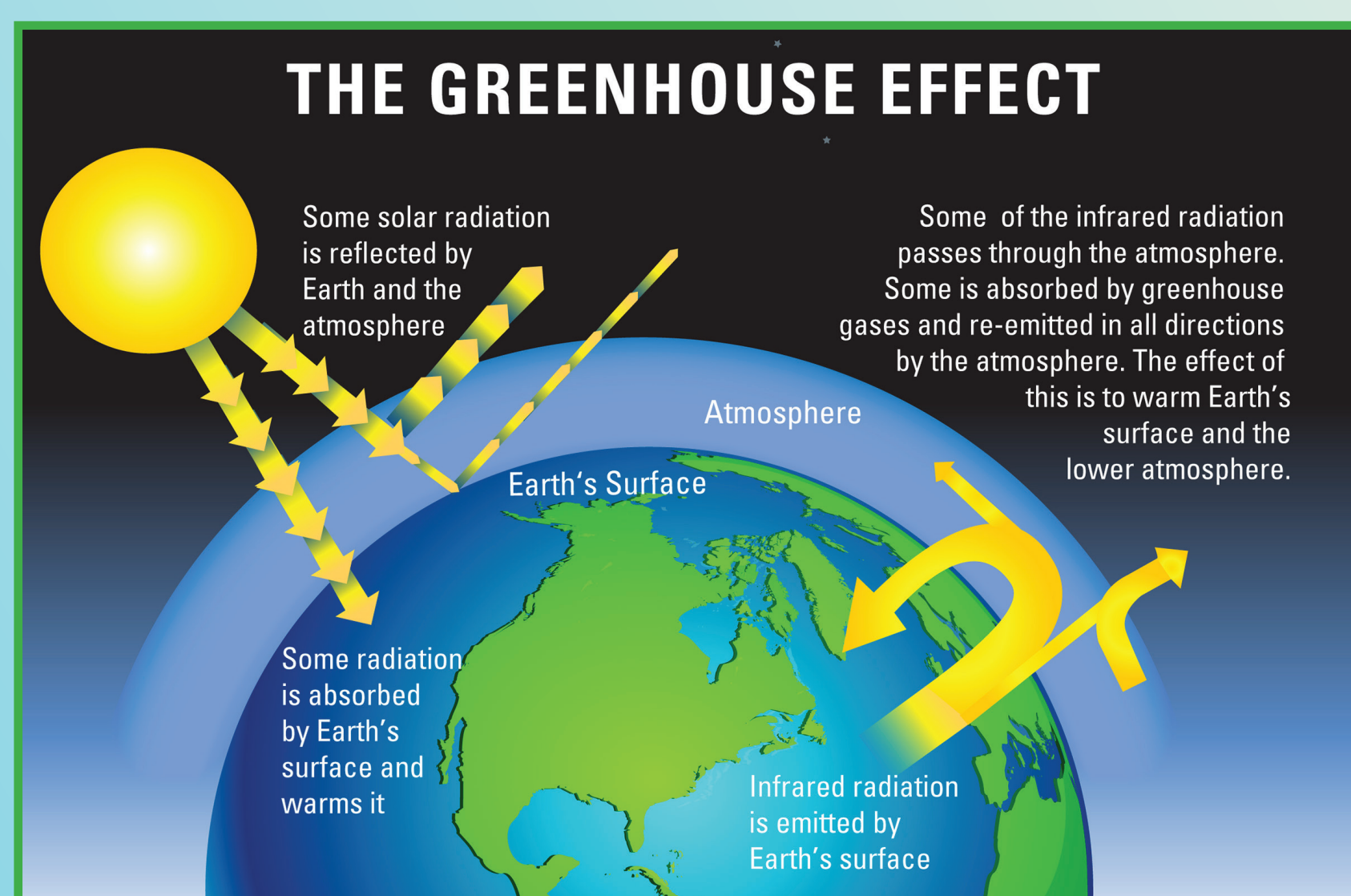


Decomposition, or the decay of organic material, is a vital process for life on Earth. Decomposition occurs when tiny soil organisms such as insects, fungi, and bacteria eat the organic material and convert it into nutrients, soil, and gas.

One of the gases generated from decomposition is carbon dioxide (CO<sub>2</sub>). CO<sub>2</sub> contributes to warming our planet through the greenhouse gas effect. During the past century, human activities have dramatically increased the level of CO<sub>2</sub> in the atmosphere, which has led to global warming. In turn, the increased temperature affects decomposition rates worldwide. It is important to study this interaction in detail.



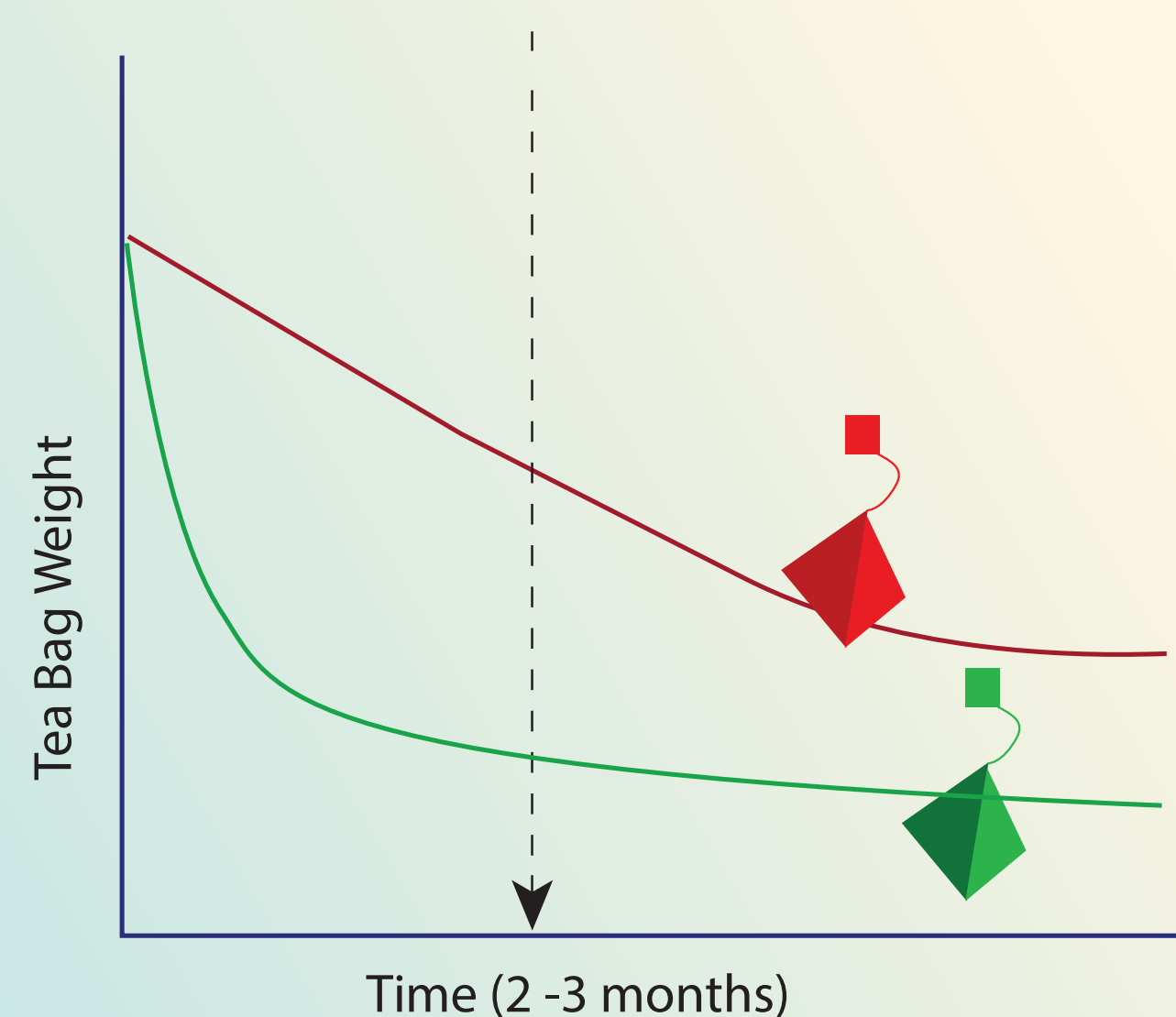
Carbon is stored in the atmosphere, vegetation, soil, deep layers of the crust, and in surface and deep water. A few of the mechanisms of bringing carbon into the system are plants photosynthesizing and storms carrying sediment down into the ocean. Decomposition by fungi and bacteria, respiration of plants and animals, burning fossil fuels, and carbon dioxide dissolving off of the ocean are some of the mechanisms that release carbon into the atmosphere.



Carbon dioxide is a greenhouse gas and contributes to warming of the Earth. Solar radiation warms the Earth. Part of the Earth's thermal radiation bounces back into the atmosphere and returns to the Earth's surface instead of radiating out into space. The amount of greenhouse gases in the atmosphere determines how much of the Earth's warmth is retained in the atmosphere. This warming effect is called the "greenhouse effect." In this way, more heat energy remains in the atmosphere, allowing the temperature to increase.

Citizen scientists can help! In the Tea Bag Experiment, you will use a simple method to examine the rates that various types of plant parts decompose and are converted by soil organisms into gas, nutrients, and soil. In this method, red and green tea bags are weighed and then buried for three months. After they have partly decomposed in the soil for three months, they are dug up and weighed again. The difference in weight before and after decomposition is used to calculate decomposition rate in your location.

Red tea is woodier than green tea and therefore decomposes more slowly. Scientists have created the Tea Bag Index which they use to calculate the rates of decomposition for the tea bags from the changes in weight. These rates will be incorporated into a global soil map of decomposition rates. The map and these rates will be used as input for climate models and will improve accuracy. As a citizen scientist, you will be contributing to real global climate research!



### The Tea Bag Index

The Tea Bag Index measures the speed of decay of plant material by using two types of tea bags (green and red). Tea bags are placed in the soil and, after three months of decomposition, the change in weight of the tea bags is determined. Decomposition occurs in two phases – the first phase is fast and the weight loss levels off in the second phase. Green and red tea bags go through the decomposition phases at different speeds. The data you collect will be submitted to the body of information collected from all over the world to help measure and model climate change.

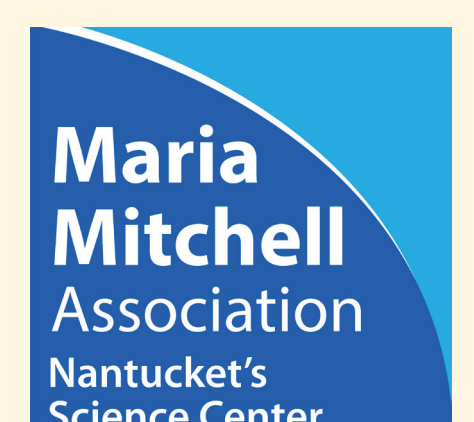


### Goals

- To create a global map of soil decay rates
- To test the relationship between the environment and decay rates on a global scale

Join us and help collect data in your backyard as part of this world-wide research project. All ages can participate.

Ask a Maria Mitchell Association Intern for a free experiment kit.



A partnership between the Maria Mitchell Association and Teatime4Science