Department of Environmental Science

Susanna Blankley

Mentor: Peter Bower

Coarse Woody Debris and Its Role in Carbon Sequestration

The canopy of most of the current Black Rock Forest dates back to over a hundred years. For nearly seventy-five years, the trees on certain long-term plots have been measured for their size, and by calculation, for their biomasses and carbon content. Research has shown that after 100 years, the trees on these plots continue to sequester carbon in large amounts. The data collected on the long-term plots is used to estimate the total live aboveground biomass (AGB) of the forest. One reason why it is important to monitor AGB and the carbon stored over time is to be able to understand how the forest responds to the ever-increasing amount of carbon dioxide in the atmosphere. With this information, it will be possible to assess its role as a long-term carbon sink. However, the AGB and carbon it contains is only a fraction of the forest's total biomass and carbon. There is a significant amount of carbon in the forest's soil and woody debris as well. The three largest contributors to a forest's carbon pool are trees, soil, and woody debris. On average, the forest's living trees harbor an estimated 33% of the total carbon contained in the forest ecosystem, the soil 51%, and the woody debris 11%. The amount of carbon in coarse woody debris (CWD) has not been widely studied. It was the purpose of this project to estimate the amount of carbon in the CWD of the long-term plots as well as to develop a set of methods that can be used in the future and further developed. We designed our project to study only CWD. We decided not to study fine woody debris in light of the fact that it contains a minimal amount of the forest's carbon; it is the CWD that makes up most of the 11%. Furthermore, in the interest of time, we found it more efficient to focus our project as specifically as possible.

It is important to know as much as possible about forest carbon sequestration in order to determine how efficient a forest can be in its role as a carbon sink. The amount of carbon dioxide in the atmosphere is increasing at a rapid rate and methods to reduce it must be found. There are doubts that the shrinking number of forests can absorb the growing amount of carbon dioxide. It is argued that they are only a temporary solution, and that those that are approaching maturity will not function as sinks in the future. Our research showed however, that this may not be the case. Although the amount of carbon that can forests sequester decreases with age, they still contain a large amount of carbon that is excluded from the atmosphere. It is possible that even mature forests can continue to sequester carbon, but this will take place in the CWD and the soil. It is imperative that this project be continued in order to further study CWD. This, along with studies on other aspects of the forest ecosystem will provide us with a better knowledge on how to maintain and increase a forest's carbon stores.