Yale Peat Carbon Project

The mission of the Yale Peat Carbon Project is to develop innovative techniques to manage and harness the natural ability of Sphagnum peat ecosystems to sequester and store carbon and to reduce harmful emissions of greenhouse gases (GHG). This project will collect field data to determine baseline gas fluxes from a variety of peatlands and synthesize current research to develop site-specific techniques to improve peatland GHG exchange. Our aim is to fight climate change at scale with low cost as part of sustainable forest management.

Peat bogs and peatlands have extraordinary ability to sequester and store carbon over the long term. Although they cover less than 3% of the world's land surface area, peatlands store more carbon than all the trees in the world (Biello, 2009). On the other hand, peatlands can be a major source of methane (CH_4), which has a potency as a greenhouse gas (GHG) of 25 to 84 times that of carbon dioxide (CO_2). While peatlands, on average, have a reasonable balance between GHG emissions and carbon sequestration, they vary widely in their carbon flux and impact on climate change (Abdalla et al., 2016). Site-specific conditions, such as water table levels and vegetative cover, can cause peatlands to decompose underlying stores of carbon and emit large quantities of greenhouse gases, particularly CH_4 (Abdalla et al., 2016). For instance, vascular plants in a peatland setting promote aerobic decomposition (transpiration lowers the water table and the vascular system delivers oxygen underground) and provide pathways for CH_4 to escape to the atmosphere (Winden et al., 2012).

The first part of the project will be to identify and study different zones of peatlands to better understand their botanical, hydrological and carbon flux characteristics. This will require developing and evaluating the most effective means of measuring carbon emissions, especially methane, which is prone to significant irregular and infrequent rates of escape into the atmosphere. Emissions measurement and analysis will likely utilize closed chamber devices and eddy covariance measurement towers.

The second part of the project is to study the effectiveness of experimental techniques for reducing methane emissions. This will likely include reducing or eliminating vascular plants, controlling the water table, and the application of safe, commonly used soil supplements such as gypsum or sulphur to inhibit methanogenesis.

The project team consists of members of the Yale Investments Office, the Yale School of Forestry and Environmental Studies, Yale College interns, and Wagner Forest Management. The team will survey Wagner-managed timberlands in Maine and Ontario to identify peatlands with mixed flora, comprising *Sphagnum* mosses as well as vascular plants, such as stunted trees, shrubs, and grasses, growing above carbon-storing peat.