Acid Rain and Forest Ecosystem Health

Despite reductions in some atmospheric pollutants, the precipitation falling on Vermont remains highly acidic.

Acid rain has many detrimental impacts on land and water ecosystems.

Notably, acid inputs increase the availability of some toxic minerals (e.g., lead and mercury) and decrease the presence of some essential nutrients.

Calcium is one critical element that continues to be stripped from forests.

The loss poses a risk to forest health and productivity because calcium is needed for cell stability and is a vital component of plant stress response systems.

Our work has documented that calcium loss has contributed to the decline of red spruce in high elevation forests of New England and New York.

We have also shown that other tree species are vulnerable to acid-induced calcium depletion.

Importantly, research has implicated calcium depletion in the decline of sugar maple throughout the Northeastern US and Canada.

We are now evaluating if calcium loss predisposes forests to decline by disrupting plant stress response systems via a mechanism analogous to immune deficiency syndromes in animals.