Dust from development operations seems to neutralize acidifying effect of emissions, study shows

July 20 2015, by Helen Metella

Nitrogen and sulphur emissions from oilsands development may be having a positive effect on surrounding forests, according to a recent study.

When forest ecologist Ellen Macdonald interpreted data collected from

forests around Fort McMurray, she got two surprises. Not only are emissions from oilsands operations having a positive effect on forest vegetation, so too is the dust that the oilsands operations stir up.

Because nitrogen and sulphur are released into the atmosphere by the oilsands industry, Macdonald expected to find what fellow researchers have noted elsewhere in the world when those elements rain down on forests.

"I was expecting to potentially see some negative effects on the forest, perhaps reduced lichen cover and reduced plant cover, and maybe reduced tree growth and vigour close to the oilsands," said the researcher from the Department of Renewable Resources.

Instead, she saw an increased number of species in the undergrowth and an increased amount of cover, particularly in a trailing shrub that's common to the area. She also noticed the sites still had high abundance of the common "reindeer lichen" species. Moreover, once Macdonald wrote up her findings for a chapter of the Wood Buffalo Environmental Association's June 2015 report on forest health, she continued to look at how the poor, dry jack pine trees that predominated in the 25 forests where the study was conducted were doing.

Even though these trees are considered sensitive to the acidifying effects of nitrogen and sulphur, and were growing in sandy soil that's not good at buffering those effects, they were growing quite well. Macdonald found that at some sites close to the oilsands development, the rate of recent tree diameter growth was up to 30 per cent greater than it had been before the oilsands development.

The explanation for all this is twofold, Macdonald says.

Nitrogen and sulphur are actually nutrients, and if they don't raise the

soil's acidity level too high, they can have a fertilizing effect. Meanwhile, researchers from the USDA Forest Service, who were also hired by the Wood Buffalo association to assist in other sections of the report, discovered that the dust created by the oilsands' active mining operations was releasing base cations such as magnesium and calcium. Those cations (positively charged ions) neutralize the acidifying effect of the nitrogen and sulphur.

Cations are also nutrients and may themselves be contributing to the forests' positive growth.

The research included data from 25 forest sites being monitored by the Wood Buffalo Environmental Association, located 13 to 130 kilometres from the oilsands, in all directions. Macdonald examined tree growth by using cores and measuring rings in the 10 years prior to oilsands development and found there were no underlying patterns of growth related to where the site was located.

She also looked at trees' growth from 2000 to 2010 and found they were growing faster where there were high base cation deposits.

The results change our perspective on what kinds of impact the oilsands may be having, said Macdonald. But at this early stage, it's not prudent to characterize that as good or bad, she said, because fertilization is not necessarily a good thing.

"I don't want to say that it's a good thing for the forest because it's changing the forest," she said. "If the forests started changing fundamentally and losing their lichen, that would be very bad for caribou who rely on things being the way they are."

It might be 10 years before we get a handle on whether these fertilization effects are positive overall, said Macdonald.

In the meantime, she is studying other sites located at the edges of wetlands. It's expected that the trees located there would catch a lot of the deposition of nitrogen and sulphur because they're growing on land that's higher than the wetlands and are more susceptible to the wind and what it carries.

Macdonald's study is one of 12 chapters in Assessing Forest Health in the Athabasca Oil Sands Region, the Wood Buffalo Environmental Association's 2015 summary of its ongoing forest health monitoring program.

More information: "Assessing Forest Health in the Athabasca Oil Sands Region." www.wbea.org/download/assessin … alth_report_2015.pdf

Provided by University of Alberta

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