



Mount Allison University student Hannah MacDonald prepares a tree core for study. She's hoping her work will help tell the story of pollution from the former Sydney Steel mill. (TOM MCCOAG / Amherst Bureau)

A history of pollution

Sydney tree rings contain metals from tar ponds, Mount Allison researcher finds

By TOM MCCOAG
Amherst Bureau

SACKVILLE, N.B.

HANNAH MACDONALD is looking at trees in the Sydney area to help her track the pollution caused by the former Sydney steel mill.

"I grew up hearing all about the mill, the tar ponds and the controversy over the cleanup," the Marion Bridge native said as she worked in Mount Allison University's dendrochronology lab. Dendrochronology is a technique of scientific dating that involves analyzing tree-ring growth patterns.

"The more I read and learned, the more my curiosity was piqued. It seemed a natural area for me to take my studies," said Ms. MacDonald, a fourth-year bachelor of science student majoring in environmental science.

Her interest became even keener as her reading showed much documentation of the pollution, especially in the second half of the last century, but no thorough record of pollution over time.

"The gaps in the paper record leave questions, particularly what pollution have people been exposed to in the century of steel-making in Sydney," Ms. MacDonald said. "To me knowing that is important."

She turned to trees as a possible answer after discussions with dendrochronology professor Colin Laroque.

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was: Did the rings capture pollution the same way?" Ms. MacDonald said. "If it did, then the record of pollution was locked there in time."

She began answering that question last summer. With a \$500 grant from the Royal Canadian Geographic Society, she visited the city to take core samples from a variety of trees including white birch, larch, white pine, black spruce, balsam fir and balsam poplar.

"We chose the site of the former coke ovens to be the centre of the study and took core samples from trees right on the site," she said. "The rest of the city was divided into four quadrants and samples were taken from trees in those quadrants. We took two samples from each tree and we took samples from about 100 trees."

The samples were then taken to the dendrochronology lab, where with the aid of high-powered microscopes Ms. MacDonald was able to determine their age. A couple of trees were 100 years old, but most were 30 to

80 years old.

"Knowing the age meant we had an unbroken record over an extended period of time," she said. "The next thing we needed to find out was if the trees did record pollution in the tree rings."

To determine that, she divided each tree core into two-year segments. These segments were then placed in a highly sensitive X-ray fluorescent machine, which detects elements and records their concentration level; in this case lead, zinc and copper.

The tests showed the trees did record levels of lead and zinc, but not copper, and that white birch kept the record better than the other trees.

"The tests also showed that the levels of these pollutants fluctuated over time," Ms. MacDonald said. "We know they are accurate because there was a major decline in levels of zinc and copper in the trees following the closure of the coke ovens in 1988."

But the tests couldn't show the exact concentration; to do that she must determine what levels of zinc and lead are normally found in trees. So she is heading back to Sydney this summer to take samples from pristine trees.

"With the knowledge from those trees we will know the natural level of those metals; we will be able to compare them to the samples we have. The comparison will enable us to determine the exact concentration of those pollutants over a definitive period of time."

"From that we will be able to create a map of the Sydney area showing these concentrations of pollutant over a period of years."

She acknowledged the information will not address the problem of what to do with the pollutants left behind by the steel mill, but she does believe her research will provide valuable information for those working on the cleanup.

(tmccoag@herald.ca)