Pass the calcium, please, but hold the salt!

Your Questions from the Webinar Answered
by Dr. Norman Yan PhD FRSC

1. Are the calcium levels in the "big 3" lakes as low/bad as in the smaller lakes in the watershed?

No. Calcium levels in the big lakes have not declined as they have in the smaller, undeveloped lakes. This is because the natural reductions in inputs have been balanced by increased in calcium inputs by us.

2. Is there a seasonality to NaCl levels in the lakes? Wouldn't that make timing of the sampling crucial?

NaCl inputs may well vary seasonally. This has not been tested in lakes with higher salt levels, so early on samples would have to be collected say monthly, starting in very early spring to document this seasonality. This is why the development of a user-friendly tool that cottager can use is so important.

3. How can people volunteer for your programs?

Please go to our friends of the Muskoka watershed Website, click on "Contact Us" and follow the prompts to tell us how you'd like to get involved.

4. You mentioned that deciduous tree leaves contain sizable amounts of Ca^{2+}. Is there a concern if people blow leaves into the lake in the fall?

Yes. Trees don't re-absorb calcium from the leaves before they drop them in the fall. Blowing leaves into the lake will thus prevent the trees from re-absorbing the Ca from the leaves as they decompose. But this shouldn't harm the lake in any way, just increase the rate of Ca loss from the watershed a bit.

5. Lake Muskoka has 'normal' levels of Ca^{2+}. I typically put my ash in my garden, with the rationale of alkalinization of the soil. Would this not benefit soil quality?

Yes, adding your ash to the garden can help, but don't add too much or put piles of it around plants. It is very alkaline (pH around 13) and can burn plants if you add too much.

6. What is primary cause of calcium decline post acid rain era, and how do we minimize the negative sources for calcium decline?

Acid rain is the main cause. The secondary cause is logging at a pace that exceeds the replenishment rates of Ca in the soil. If you cut tree, leave the branches, twigs, and leaves, and perhaps the bark behind in the forest. That's where most of the Ca is.

7. Deciduous trees require more Calcium than coniferous trees (as per the presentation). Are deciduous trees more efficient at carbon capture than coniferous?

This is tough to answer, as C capture varies with species, with the age of the tree, with other potential limiting factors (light, moisture, N). Also, while softwoods can grow faster than hardwoods, the wood of hardwoods is denser, so there might be a trade off. In Muskoka, it's the hardwoods, especially maple that are currently limited by low Ca.

8. Any chance there is a safe alternative to NaCl on our icy roads?

First, we could use a lot less NaCl, using it as a brine, not a solid, or using if along with MgCl.

9. What's in our wood ash that is regarded as noxious? For 7 decades our family has put cold wood ash in the compost heap within 15 feet of shoreline. Guess where our healthiest trees are? Right there!

I don't believe there is much in wood ash that is "noxious", but the MOE is very concerned about the metals in the ash. We had to measure the levels of 11 different metals, and prove they were below levels considered toxic. They all were. I'm not surprised your healthiest trees got the ash. Afterall ash provides essential nutrients that were deficient in our soils to start with, and they we had half a century of acid rain.

10.Was the math that one ha of forest captures 1 tonne of carbon annually?

Yes. That is the general number that foresters use. In Florida, it's 10 times that. But even at 1 tonne per ha the 20% reduction that we believe is caused by low Ca is huge.

11. What more recent forms of manmade pollutants, (airborne or otherwise), have caused further calcium decline, and what changes are required to return lakes and forests to their more naturally occurring calcium levels?

Historical acid input is the key cause, but more recently, logging can also contribute as in Muskoka typically 30 to as much as 60 or 70% of all the Ca in the watershed is actually in the trees. As this Ca pool is removed with logging, the newly growing forest draws more Ca from the soil.

12. From my laymen's perspective, it may not be a long-term solution by donating ash, but it does provide a way to show how to reverse current trends. For example, if all full-time and seasonal residents of Muskoka dropped off their ash once per year through a District Municipality of Muskoka program, how much ash can be collected, and how many acres of sugar maples could be brought back into acceptable calcium levels?

Yes. it is long-term, but it took 60 years to create the problem and it won't be fixed quickly. We generate about 300 tonnes of wood ash a year in Muskoka, enough to treat about 150 ha, I believe. That would replace all the Ca lost to acid rain, so we'd only have to treat the soils once. At this rate, it will indeed take a while but, to quote" Society grows great when old men plant trees in whose shade they will never sit".

13. The Ash Collection Program can't be a permanent fix, as, it is not reasonable to spread wood ash by hand throughout all of Muskoka/Ontario/the world.

Correct. This year we will be working out the methods to spread it mechanically. We only did it by hand in our experiments.

14. There are negative consequences from burning wood. For example, we increase our carbon footprint by burning wood.

We are not suggesting that any switch to burning wood for the ash it would generate. However, for those already burning wood, this is a way to partially offset the GHG's generated.

15. Does the calcium collected from wood ash offset the negative carbon emissions from burning the wood?

In part, I believe it does over the longer term, by potentially increasing wood production by 20% in the forest. However, it can't be perfect, but better than throwing it out.

16. Mr. Riley can likely attest to the decline in wild blueberries/strawberries/raspberries/blackberries naturally occurring around Leonard Lake, and, Muskoka Lakes generally, along with the near extinction of common loons, plus extinction of crayfish at Leonard Lake. The hardwood forest growth is in decline, where trees are dying faster than generation of new growth forests. Promoting the Maple Lot at Riley's Farm is most commendable. Can anything be done on a smaller lake to treat calcium levels and then, possibly re-introduce crayfish species, where the professional study groups could gather data and document results?

I was involved in liming experiments in lakes in my youth, up in Sudbury. It works to restore lake health if lakes are acidic. However at the moment, the MECP won't let us add ash anywhere near a lake, as they still consider it to be a waste. They know we are adding it to fix an historic problem of Ca loss, but the only way they can regulate it is as a waste, not as a soil amendment or a fertilizer or as a restorative procedure. We need to change that.

17. The subject matter is extremely interesting, is of great concern, and, hopefully, more can be done to lobby governments to reverse increases in salinity and decreases in calcium levels. Does Dr Yan have an economical and "greener" environmental substitute for road salt use around Muskoka Lakes, and elsewhere?

Key things are; switch to brines from solid NaCl and get all salt contractors to be smart about salt certified so they learn that they can use about 10X less salt than they currently use. The real issue is fear of lawsuits for slip and fall injury leading to huge over applications of salt. If we start with the insurance industry, getting people to wear the right footwear in the winter, and getting both landowners and contractors smart about Salt certified we could dramatically reduce the use of salt. Also, we might use ash instead of salt and cure two problems at once.

18. Aside from ash collection, what can we do collectively or individually towards arriving at a long-term sustainable solution to these problems?

Join the Friends of the Muskoka Watershed!

Thank you for submitting your questions!

If you are looking for a ash collection containers call the Friends of Muskoka Watershed office at 705-640-0948 to arrange for a pick up at their office located at 126 Kimberley Avenue in Bracebridge.