

INFORMATION MORNING - NS
with PORTIA CLARK
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**How Current Research Could Clean up Toxic Waste Left
Behind from Gold Mining**

MS. CLARK: Well, last week on the show, we spoke with environmental science professor Josh Kurek at Mount Allison University and he told us about a research project measuring how mercury and arsenic from centuries-old gold mines are still affecting freshwater ecosystems now. Kurek told us that climate change and local development projects are creating conditions that allow the arsenic to be more mobile and released into the water.

Researchers are also looking at ways to remediate the impact of historic mining activity and to find out more about that the CBC's Rose Murphy spoke to two members of the DEHR Group. That's the Dynamic Environment and Ecosystem Health Research Group at Saint Mary's University here in Halifax.

Linda Campbell is a senior research fellow and professor of environment science at SMU, and Emily Chapman is the senior research project manager. The interview was done with an interpreter both in ASL and English, and Rose started by asking Emily Chapman by what they mean remediation in this project.

MS. CHAPMAN: So remediating or risk managing these type of shallow water settings that we're usually looking at, because a lot of the time the tailings or the mining waste was just dumped in low-lying areas, wetland areas

actually, and the remediation of those type of environments is really challenging. Traditional approaches that even today is dredging, for example, so you would dig out the material. Or another approach is isolation capping, so put really thick areas of sand and clay on top of the contaminated material to ... just to isolate it.

But the issue with those type of technologies is that you would destroy the wetland area in the process and that's not something that we want obviously; wetland areas are really important ecosystems for many different reasons.

And so what we're doing with our research is we're trying to come up with customized risk management approaches that can actually be used without impacting the wetland in the process.

MS. MURPHY: So what are you learning through your research about the best options for dealing with these historic tailings?

MS. CHAPMAN: Yeah, it's a challenging question there because there's not really one solution to this problem, it really depends on the site. That's why it's so important to really investigate these sites and know what we're dealing with in terms of the form that the contaminants are in, for example. Because that will

really ... it will decide what type of remediation is appropriate or risk management.

At some sites, for example, it might be appropriate to do nothing at all. Disturbing this material unnecessarily could lead to the contaminants becoming more mobile. At other sites, we'll definitely need to do something and it could be a range from, you know, these traditional approaches of dredging or isolation capping to more gentler approaches of looking at trying to reduce the toxicity of the contaminants in place without impacting the wetland areas and that's what we're looking at with our research.

DR. CAMPBELL: If I can just add to Emily's comments there and just emphasize the magnitude of the issue that we're facing here in Nova Scotia.

64 formal gold districts were established in the 1860's for that historical mining. And so at that time for gold mining regulation there really wasn't anything around and so within those 64 districts across Nova Scotia from Yarmouth all the way to the Eastern Shore there's over 360 mines, you know, that we know of. And of those mines not all of them processed ore onsite; a lot of the mines would ship out their ore to more central stations where they would process the ore in the mill. And so where the processing happened is where the

contaminants are.

The scope and scale of the issue is just really not just, Oh, we're just going to find one spot and fix that, we really do need to go to each and every of those 360 mine sites to understand them more fully.

And, as well, what adds to the complexity of the issue is that a lot of the tailings, the ore was processed using freshwater, and so that means where the water is from that they took to process the ore is where they would take that wastewater and put it back to.

And so the tailings themselves are also mobile over the hundred years, the tailings have been moving downstream and then they'll move on to the next lake or the next river system, the next wetland, all the way out to the ocean. And so the old maps that we have, we're actually needing to amend those to find out where the tailings had been moving over the hundred years.

MS. MURPHY: So you've kind of answered this, but what do we still need to know in order to effectively manage the contamination and limit the impact on surrounding ecosystems?

DR. CAMPBELL: When we started researching the site, the first thing that we did was go to the historical archives and we collected any of the old reports, any information, photography, maps that was produced during

the gold mining time and there was some quite good documentation taken. So we started there with the historical archives and just trying to understand the extent of the problem and what was done at that time and then we used that information to inform the decisions that we're making now.

And then we started collecting field data which is the concentrations of different elements: mercury, arsenic, a whole suite of other items. And we're not only looking at the tailings and the sediment but we're also looking at the organisms themselves to see how much arsenic and mercury concentrations are within those organism and that tells us how much is available. And so there's a process that we're going through that's very successful to understanding the type of questions and barriers that we need to consider.

MS. MURPHY: Is there anything that you're sort of coming across that seems encouraging for how we might be dealing some of these historic pollutants?

MS. CHAPMAN: Yeah. So we've been doing research, as Linda said, moving through stages and starting very small with little vessels and finally we're going to move out into the field and do some testing in plots out in actual contaminated wetland areas within the next few years. And I think with every step of the way we're

refining what we're doing more and more and we're getting to understand what works in some situations might not work in others. And I think that they're ... so far it's looking very promising. Nothing has been published yet but we're getting there.

And we're not really trying to replace traditional approaches that are out there, we're just trying to add to the toolbox for risk managers of how they can deal with these sites because we're going to need all the different methods that we have to figure this out.

MS. MURPHY: So here we are in 2022, there's one gold mine currently operating in the province and there are at least, it sounds like, five others being proposed. What can we take from your research about dealing with the pollution from these historic mining sites, how much of that could help guide the way we approach any contemporary mining projects?

MS. CHAPMAN: Our work is very much focussed on the historical practices and how they're impacting our environment today, because they are still impacting us on a daily basis and impact everybody. So our work is very much focussed on how to prevent, you know, and make, you know, the beautiful Nova Scotia environment, we don't want it to be even worse.

So what we are wanting to do is make wetlands re-

naturalized that had been impacted, improve the health of these wetlands, and improve them for recreational purposes for a whole myriad of activities that we need wetlands for. And that we need to have better water quality through wetlands to slow down climate change impact, and really, I have to say that really does impact us all of us here in Nova Scotia.

MS. CLARK: That's Linda Campbell and Emily Chapman of the Dynamic Environment and Ecosystem Health Research Group, it's at Saint Mary's University. You heard them speaking there with the CBC's Rose Murphy.