

# Good water neighbours

*The mining industry is shifting from water management to water stewardship to address the global freshwater crisis*

By Alexandra Lopez-Pacheco



**T**here is near international consensus that for the world to decarbonize, the mining sector must ramp up its production of critical minerals. But in the process of producing the raw materials for electrification needed to slow climate change, the water-dependent mining industry risks contributing to another concern: the availability of fresh water. Forces of industrialization, agriculture, climate and population have endangered this essential resource. Between 2019 and 2022, the mining industry's worldwide water consumption increased by 25 per cent, according to the International Energy Agency.

A 2023 Global Commission on the Economics of Water report warned that the world is facing the prospect of a 40 per cent shortfall in freshwater supply by 2030. This average masks even more severe impacts in regions where many critical minerals are mined. For example, the World Resources Institute predicts that copper-rich Chile, which has been experiencing historic droughts for the past 15 years, could deplete its water supply by 2040. According to a PwC report released in April of this year, more than 50 per cent of the world's copper mines and 74 per cent of lithium and cobalt mines will face drought risks by 2050.



Stantec workers undertaking a mine-area-water environmental survey at a site in Nova Scotia.

“The mining sector has seen concerns about environmental impacts from mining companies for decades—and we see them specifically around water,” said Jocelyn Fraser, a University of British Columbia (UBC) instructor and research associate at the university’s Bradshaw Research Institute for Minerals and Mining (BRIMM). “Now, it’s almost a perfect storm of a number of different issues converging at the same time.”

Mining’s conventional approach to water management as an operational-efficiencies issue, say industry leaders, will not be enough for it to navigate through the storm. Instead, the

industry needs to embrace a far more holistic and collaborative approach that takes all of the needs of water users into account. Mining’s future, they say, lies in the sector increasing its focus on water stewardship.

### Troubled waters

The water crisis is already setting off a cascade effect that is impacting some mining projects. Anglo American’s Los Bronces mine in central Chile, one of the world’s largest copper mines, has been grappling with water scarcity for more than a decade. The mine’s “water-supply system is largely dependent on the availability of surface water, which, in turn, reflects climatic and weather conditions and is consequently highly variable,” said Patrick Mullen, head of water management at Anglo American.

To cope with drier years, water is stored in the Las Tórtolas tailings dam during the years with more rainfall. Owing to the long and continuing drought in central Chile, Anglo American has moved to reduce its reliance on surface water by sourcing alternative water supplies such as desalinated sea water.

Although mining projects in Canada, which is home to 20 per cent of the world’s fresh water, are clearly at an advantage over those in countries such as Chile, there is no guarantee that some might not also face water-supply volatility due to unpredictable weather conditions. For example, Centerra Gold’s Mount Milligan mine in British Columbia, located 250 kilometres north of Prince George, had to temporarily shut down milling operations in 2017 and scale them back in 2018, until the project was able to secure an additional water source.

As mining projects face the risk of water scarcity, so do human populations near their operations. Already, some two billion people worldwide lack access to safe drinking water and approximately half of the world’s population experience severe water scarcity for at least part of the year, according to the Intergovernmental Panel on Climate Change.

“Communities have legitimate concerns about water security and having access to sufficient quantities of safe drinking water for their daily lives,” said Fraser. “Their concerns about competition for an increasingly scarce resource are a potential trigger for conflict—and I think we’re seeing that conflict shifting from reactionary conflict to precautionary conflict.”

In recent years, that precautionary conflict has resulted in mining projects around the world being blocked by regulators or delayed due to community and environmental concerns over water. In 2021, the government of Alberta was forced to backtrack on its decision to lift a ban on coal mining in the Rocky Mountains due to public concerns over water. In 2022, after massive protests over fears that Rio Tinto’s Jadara lithium project in western Serbia would damage water and land, the country’s government revoked the project’s licences. In 2023, the proposed Pebble mine project in Alaska was denied permits due to its potential water-related impacts.

The pressure is not just coming from the public. It is also coming from investors, especially after the 2014 Mount Polley tailings dam failure in Canada contaminated the Fraser River watershed with 24 million cubic metres of spilled mining waste and the 2019 Córrego de Feijão tailings dam failure in Brazil that killed 270 people.

“The investor community at that point started to wonder what its role was in responsible tailings management and that’s also come through in the water area as well. Investors are starting to develop a lot more tools to understand their water-related

risk exposure, as well as climate risk,” said Nadja Kunz, co-lead of water stewardship at BRIMM and an assistant professor and Canada research chair in mine water management and stewardship at UBC. “I do see the investor community also putting a lot of pressure on the industry to make sure it’s being very proactive in the way it manages water. So, the pressure on the mining sector is coming from every angle.”

Along with investors and the public, there is also pressure coming from regulators. “Environmental standards or regulations are getting tighter and tighter with the goal of conserving the environment and to protect the communities that are impacted by the release of mine water,” said Henlo Du Preez, Canada West industrial water practice technology leader at Stantec. “Those stricter regulations mean there are stricter water treatment targets—which require more sophisticated treatment strategies.”

## Water stewardship

There has been a huge shift over the last decade in what the mining industry considers best practices in water management. “The biggest change has really been a mindset shift in our thinking about water issues beyond the fence line,” said Kunz.

Today’s best practices emphasize the holistic approach to water stewardship, adding engagement with other water users and consideration of the needs of ecosystems to solve shared water risks, as well as increased transparency and disclosure on water use and management performances.

“It’s much more of a catchment-based approach that is looking beyond the mine lease and saying ‘what is our role within the catchment? How do we interact with other users, what’s our responsibility to other users?’ It is also going beyond regulatory compliance,” said Kunz. “There’s also more pressure on the sector in regions where there might be weak governance, for example, to take a bit more leadership and potentially work with regulators and governments to improve regional water outcomes.”

That shift, said Kunz, represents a change in the kind of expertise needed. “Good stewardship is quite different from

water management,” she said. “It needs a lot more skills in the social domain, in negotiation, in understanding stakeholder needs and interacting with other users in the catchment.”

The water stewardship perspective can lead to nuanced but transformative changes that ultimately help mining operations and the industry as a whole to build trust with various stakeholders. For example, mining companies have traditionally reported one number for company-wide water usage. “How relevant is that to local individual communities of interest?” said Fraser. “Communities want to know about the site-level data.”

The Mining Association of Canada (MAC) has been a leader in the mindset shift. In 2004, the organization introduced Towards Sustainable Mining (TSM)—a standard for environmentally and socially sustainable mining. In 2015, it added a framework to describe member commitments for water stewardship.

In 2018, MAC released the water stewardship protocol—a set of performance indicators and tools to help its members measure their water governance, operational water management, watershed-level planning and water performance, as well as reporting at the mine site level. TSM also addresses this topic at the mine site level, with an updated Indigenous and community relationships protocol introduced in 2019.

“Water stewardship is becoming increasingly important,” said Charles Dumaresq, MAC’s vice-president of science and environmental management.

MAC’s water stewardship protocol provides companies with a framework they can follow to improve their performance in phases. “It’s not an easy commitment to maintain,” said Dumaresq. “But there’s an increasing recognition that it is a really good way to do things—not just for water but across all the aspects that we cover within TSM.”

In November 2023, ICMM also introduced the ICMM–Water Stewardship Maturity Framework. As a member of the organization, Anglo American supported the development of the initiative and, using the guidance, has completed a review of its shared water challenges with other users within the majority of the catchments where it operates.

## Doing the right thing

A water stewardship approach can also help increase industry adoption of water-saving and risk-reducing tailings technologies by building a stronger business case for their use, something that has been a challenge for the industry in the past.

More and more mining companies, said Andrew Watson, senior principal of mining at Stantec, are taking a long view when it comes to water stewardship. “It’s really about asking themselves how they can set themselves up to be good stewards of the space for a long time,” he said. “They’re taking a step beyond what’s written in the law today, and thinking about what’s the right thing to do, because it’s not just about meeting the law, it’s also about being good neighbours with the community.”

Part of that trust-building, said Laura Volden, a hydrogeochemist with SRK Consulting, involves communicating more transparently with the public and helping communities understand the mining industry’s scientific and technological advancements in protecting water and the environment. “Companies are becoming more transparent with the type of work that’s being done,” she said. “But it doesn’t make headlines in



The arid climate where Freeport-McMoRan’s Cerro Verde mine is located near Arequipa, Peru, demands water-efficiency in all aspects of operations, from tailings management to the sourcing of process water from the treatment of wastewater from the city.

Courtesy of Stantec



Courtesy of MAC

Agnico Eagle founded the Drinking Water Distribution Network in 2019, which provides drinking water to communities near its Pinos Altos mine in Chihuahua, Mexico.

the newspapers. I think there are a lot of professionals like me whose job is very literally to enable mining to happen sustainably in the best way possible.”

Increased collaboration between technical disciplines, and commitment from producers to dedicate resources to research and development, has resulted in more robust risk assessments, said Volden. This type of collaboration and funding has led to advancements in water treatment technologies, mitigative strategies and changed the overall approach to water management to focus on prediction and prevention rather than reaction.

With the lessons of historical unintended consequences of mining’s impact on water, today’s scientists study new potentially unintended consequences as well. “It’s interesting that the treatment technology that removes everything we need to remove—which is membrane treatment technology—actually removes too much of everything from the water,” said Du Preez. “You end up with water that is depleted of essential nutrients and minerals. So, you need to put back the good minerals into the water before you can release it downstream.”

### Building collaborative partnerships

Forming collaborative water stewardship partnerships starts with recognizing the rights of local parties who have an interest and are impacted by operations, said Fraser. “A true partnership requires input from both to design the project, but it also requires shared decision-making, which can be challenging for mining companies. And then you need to formalize water-related accountability, so that there are clear roles and responsibilities for the members of the collaborative partnership.”

In July 2023, it was reported that a consortium of mining companies, including Glencore and Anglo American Platinum, had joined forces to build a US\$1.5 billion water project in South Africa to supply their platinum and chrome operations with water—and several hundred thousand people with drinking water—by 2030.

Globally, the biggest issues are access to drinking water and/or sanitation, followed by water quantity. According to Anglo American, together these issues account for over 60 per cent of its stewardship projects. To solve Los Bronces’ water scarcity challenges, Anglo American’s new water-management strategy has been designed to secure water for the operation

while at the same time avoiding affecting water sources for human consumption. The strategy includes a partnership with Chilean water desalination and solutions provider Aguas Pacifico to build a desalination plant that will supply Los Bronces with more than 45 per cent of its water needs while also providing clean water to approximately 20,000 people in local communities. Construction of the plant is expected to be completed in 2026.

The proposed project is reminiscent of the now renowned 10-year-old water-stewardship success story at Freeport-McMoRan’s Cerro Verde mine in Peru. The company built a water treatment plant that treats wastewater from the city of Arequipa. It uses some of the treated wastewater for its operations and returns the rest to a local river.

### Good neighbours

Ultimately, proactive engagement with stakeholders to support water stewardship has the potential to not just help the industry navigate through the water crisis and help solve it but also to end a vicious circle that has plagued it for decades. “The reason why permitting is taking as long as it is, is because people don’t feel heard in the process,” said Fraser. “If regulators try to create a sense of urgency around permitting, those who are opposed will probably see that as an opportunity to really dig in their heels and try to slow the process down further. Until we’re able to gain a little bit more trust that mining is intending to act in the best interests of society, we’re going to continue to encounter communities that say, ‘well, our best way to influence the outcome is to be opposed to the project.’”

Watson also believes the water stewardship approach can have a profound and transformative impact on the future of mining. “Water is something that people can get very vocal about,” he said. “If the water stinks, makes somebody ill or if there isn’t enough water, you’re infringing on somebody’s basic human rights.

“I think mining companies realize the biggest lever they have to pull with respect to public relations is to make sure that everybody has a reliable supply of good clean water. If we’re good water neighbours, we can probably become good neighbours in other aspects. But if we aren’t getting along around water, we’re likely to not get along around other things, too.” **CIM**