

How miners can hurdle the water barrier to growth and efficiency through understanding its real value

Water is essential for mining. While excess water removal and disposal might pose problems of its own for some miners, mining would cease without water for process, potable and dust control applications. The ability of miners to organically grow existing operations and construct new mines depends heavily on the ability to secure and manage water supplies in the face of falling availability and increasing stakeholder scrutiny. The importance of successfully managing water to mining businesses as well as our export economy cannot be underestimated.

Water is different to other business inputs in mining. Of all major consumers of water, mining is unique in that operational locations are not driven by access to water. The economics of supply vary enormously by location – access can be hugely capital-intensive. Many water markets do not allocate water efficiently, and more cannot necessarily be had by paying a higher price. It is easier to understand the price of water than its value, so we tend to underestimate the impact of supply interruption.

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Mines typically source their water from ground water, stormwater, imports, municipal supplies or some combination thereof. Perhaps because water is perceived as a second-order issue, many mining businesses do not look beyond the price they pay for their water supplies in assessing the costs, risks and potential benefits of a sound water strategy. Consequently, when step-changes in the price or availability of water become imminent, many businesses are unprepared and react with high-cost responses – a more strategic outlook may yield a more cost-effective, lower-risk outcome.

At a minimum, miners should consider the:

- Cost of interruption – What would I do if my current water sources were compromised?
- Marginal value of supply – What could I do with one more megalitre? What can I do with less?
- Marginal value of better quality – What could I do if my water was 1% less saline?

Understanding the true value of water – qualitatively and quantitatively – enables mining businesses to make informed water supply investments to maximise output, minimise costs and manage the risks of business interruption.

Warning signs of long-term supply deficit already exist

The export value contribution of water used in mining far exceeds other forms of water consumption, and the projected growth in mining output will demand significant expansions to existing operations as well as the establishment of new mines.

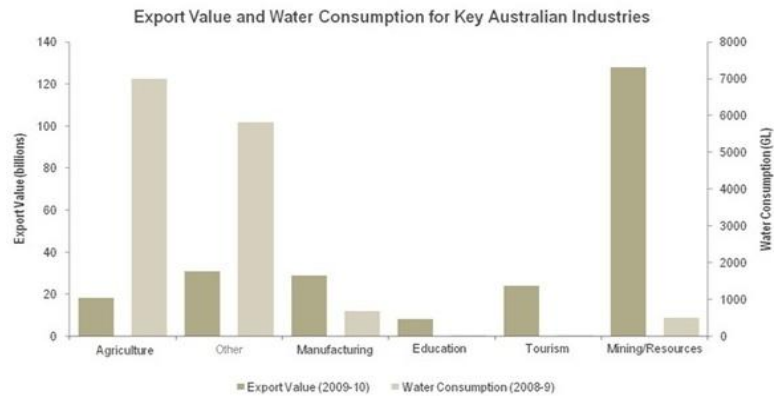


Figure 1: Export value and water consumption for key Australian industries. Sources: Water Use by Sector: ABS, Water Account 2008-9, Export Values: IBIS World (2010)

Against this backdrop of increasing demand across all sectors, already pressurised water supplies are deteriorating in yield and quality. Supply deficits in urban areas and environmental concerns over managing water resources are consequentially impacting regional supplies. Miners and farmers are already experiencing pressure to reduce their requirements to offset shortages elsewhere – and the future seems no more secure. Most climate and statistical models of drought incidence highlight increasing frequencies and durations of drought in most areas of Australia over the coming decades (see Figure 2).

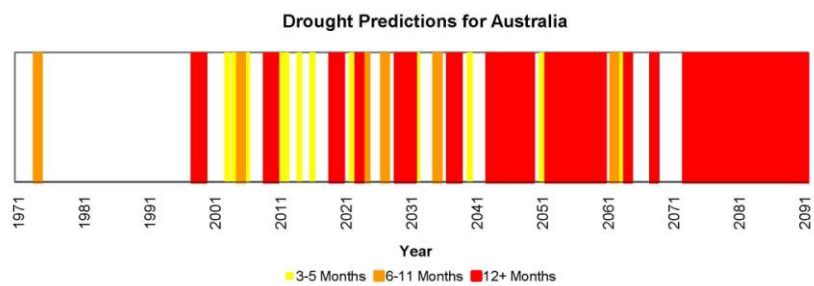


Figure 2: Drought frequency and duration are expected to increase significantly over the medium term. Source: Urban Water Alliance, Annual report 2009-10

These concerns are already visible in the limited water trading markets around Australia. As supply tightens, rising spot water prices are expected to escalate sharply, presenting real cost risks for vulnerable users. As well as a doubling in spot prices, many urban users have already seen increases of 50-100% in price to recover the additional costs of supply security. These price rises will dramatically change the economics for water supply authorities, especially in areas where residential usage presents a competitive threat to supply.

Cost of interruption

Most mine sites have limited redundancy in their water supply infrastructure and limited storage capacity (compared to their total demand), making them vulnerable to a range of natural and man-made interruptions. These directly affect throughput and cost, potentially for an extended period of time.

Understanding and planning for the plausible risk scenarios can produce low-cost options to reduce these risks – whether commercial (such as contracting for backup supply), operational (such as prioritising usage when supplies are restricted or making contingency plans for the failure of critical infrastructure) or capital (such as building additional on-site storage). The first step in assessing what to do is to understand the cost of doing nothing.

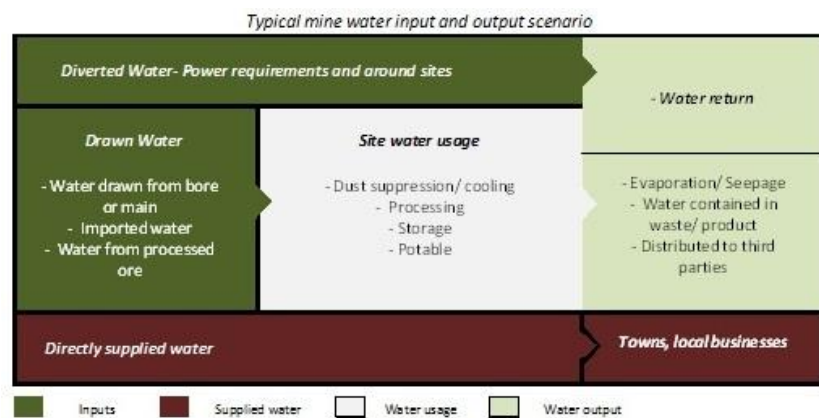


Figure 3: Potential areas of interruption on a mining business- typical water input and output scenario
 Source: Diagram inspired by Rio Tinto Group water Strategy (2010)

Marginal value of supply

Consider the marginal value of supply for each part of the business: What could be done with additional volume? What would be the impact of an incremental reduction?

With a clear picture of the marginal value of water supply, businesses can make sound investments aimed at economical water use and optimising the allocation of resources between applications. For example, many mining businesses find rapid-payback projects in areas such as waterless processing, onsite recycling and treatment, process consumption reduction and behavioural change and training.

Others find a case for investing in innovative new supply sources, such as large-scale stormwater capture and storage. In contrast, prevailing Take or Pay contracts for water supply acclimatise operators to a set level of consumption where little value is placed on using the full allocation or operating more efficiently. Operators have the opportunity to negotiate incentives and mechanisms to allow water efficiency to be properly valued, whilst improving the capability to manage the risk of supply interruption.

Miners will experience increasing pressure on their social license-to-operate, as responsible water management gains further traction as an issue amongst the community. Where water supplies are restricted, businesses risk being scrutinised if their consumption reflects different values to that of their communities. Incorporating non-monetary values (environmental, social) into the risk management framework of the business clarifies its value of water and can also serve to enhance the reputation of the business in the community.

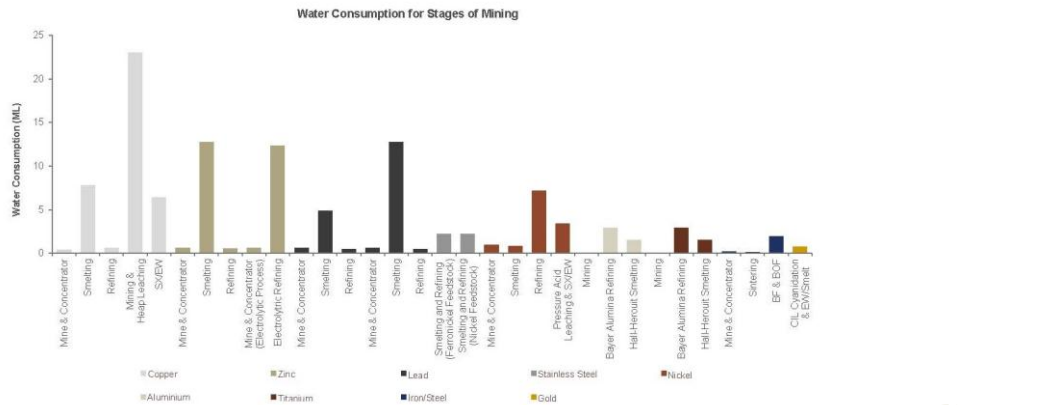


Figure 4: Typical spread of water usage intensity by product
Source: CSIRO, Water Use in Metal Production: A Life Cycle Perspective (2004)

Marginal value of better quality

Very little of the water used in a mining operation is, or needs to be, treated to the standard of municipal water supplies. There is enormous variation in the quality of water used for non-potable applications and it should be noted that many of Australia's aquifers are saline or hypersaline, which represents a significant management challenge.

Although salinity does not prevent water being used for certain applications, it can have a major impact on costs – whether through increasing reagent consumption, more rapid corrosion of supply assets, or introducing undesirable compounds into the final product. Understanding the cost impact of water quality and the economics of the mitigation options – including developing higher-quality sources or increasing the quality of existing sources (such as through distillation or reverse osmosis) – is fundamental to optimising a mining business' water strategy.

Some studies show the marginal whole-of-business costs of poor quality water can exceed \$4 per kilolitre in some applications – considerably more than the sourcing cost itself. On a typical mine site with consumption of 10 megalitres per day, this can imply a annual cost of over \$14 million, or close to \$300 million over a 20-year mine life.

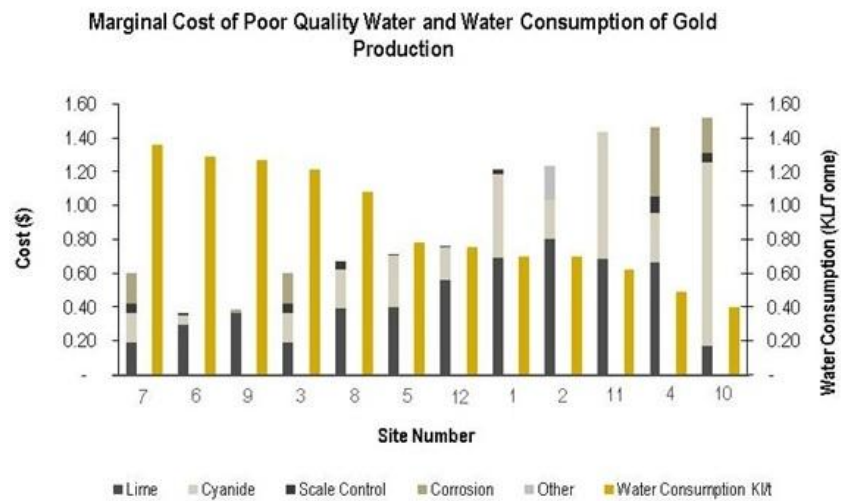


Figure 5: Marginal cost of quality- Gold example
Source: GEDC (1999)

Turning understanding into strategy

Understanding these challenges enables more effective planning and investment decisions which can reduce cost, mitigate critical risks as well as streamline operational processes. Without deeply considering these issues in detail, most miners may find it difficult to justify allocating resources to develop and sustain their water strategy. It can be a vicious circle: lack of comprehensive focus on the issue and a lack of resources to forward plan, leading ultimately to reactive management and crisis-driven investment.

Mining businesses which dedicate resources and teams to develop and manage water strategies benefit from maintaining control over internal and external events as they happen.

A vital building block of the modern and sustainable mining business needs to be a comprehensive understanding of the economics, risks and license impacts of water use. Articulating a clear and concise water strategy can present not only sound and value-creating project opportunities, but also options to pursue greater and more far-reaching infrastructure projects.

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