

Liquid assets: Water footprint and access to capital

Maureen Upton, Principal Consultant

Water in Mining
Prospectors and Developers Association of Canada
March 8, 2017

@SRKConsulting
@maureenupton

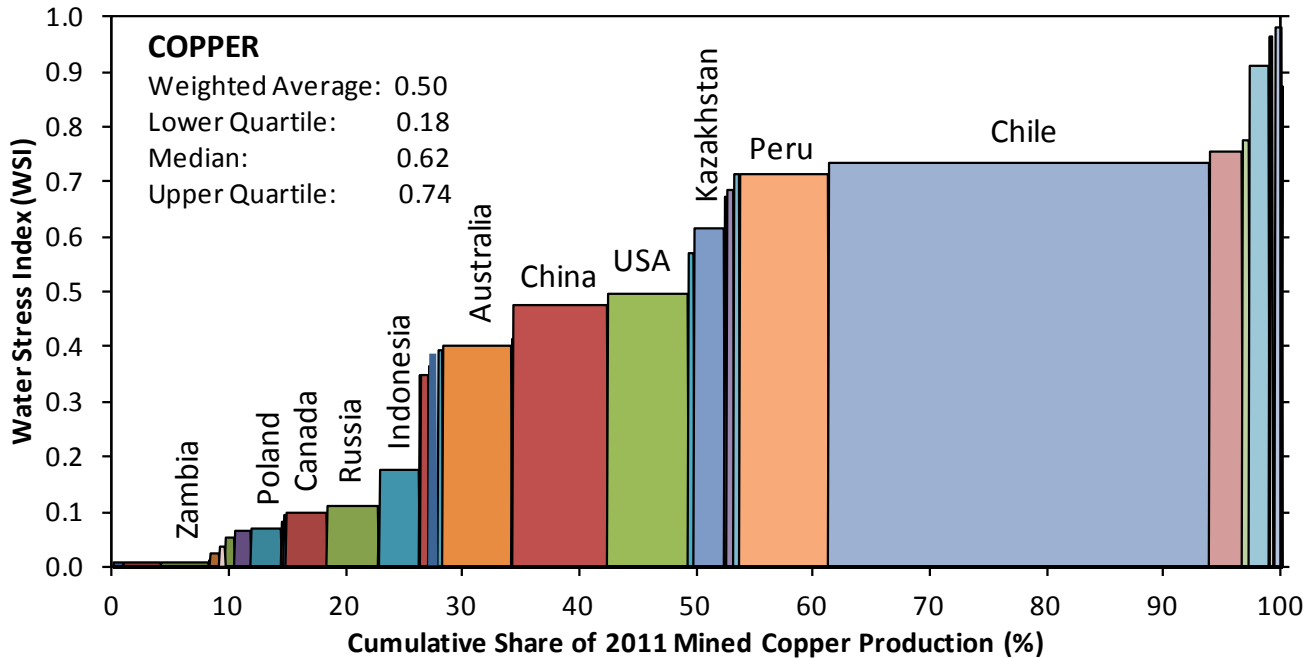
Why focus on water and valuation?

- Water: the key reason mining projects are delayed or blocked
- Long-term investors increasingly focus on water-related risk
- Sustainable Development frameworks, e.g. SDG6: Clean water and sanitation.

Water Footprint: Expanding the discipline of mine water management

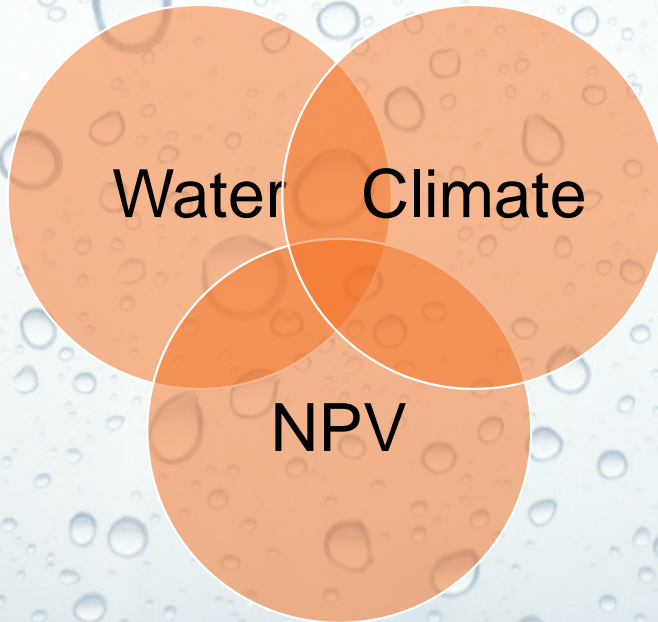
- Impact on water from the entire mining life cycle
- Water scarcity
- Social aspects, affects on other users

Copper Industry is Highly Exposed to Water Scarcity and Stress



Northey et al., 2014. Minerals Engineering, 69: 65-80.

Water and Valuation



Financial Risk from Climate Events

- Most water risk discussion focused on individual site level
- Global/portfolio-level analysis of financial exposure: significant risk from extreme climate events (heavy rainfall or drought)
- Premises:
 - Global mining companies may face correlation in climate-induced risk across sites, with extreme conditions in the same year beyond design level. Tendency to weight recent history more than past
 - Long-term investors need to account for risks over several decades, esp. climate and environmental risks
 - Portfolio risk can be measured by a water risk index which indicates financial exposure across sites

Forthcoming study (Bonafous, Lall, Siegel) in *Hydrology and Earth System Sciences*

How Heavy Rainfall Inflicts Financial Damage on Mining Operations

- Production losses from flooding of operations, roads, dams, electricity infrastructure, housing
- Fines for clean-up of released pollutants from tailings
- Increased dewatering costs
- Ecological damage, impact on human health/casualties
- Increased insurance premiums
- Increased regulation, design standards
- Asset stranding if restart is not feasible

Financial Risk from Climate: Merriespruit Tailings Dam Failure

- Dam failed from overtopping after heavy rainfall (50 mm in 30 minutes), February 1994.
- 17 people killed, 80 homes lost.
- Led to new policies, higher design standards & monitoring requirements for TDs.
- Yet, did not lead to evaluation of risk management methods from extreme rainfall, other than purchase of insurance



Financial Risk from Climate: Queensland Coal Mine Flooding 2010-11

FLOODS SHUT 75% OF AUSTRALIA'S COAL MINES



Source: Reuters, Daniel Munoz (1/5/11)

"An estimated US\$1 billion has been lost in coal production.



- Extensive damage to mines & related infrastructure
- Long dewatering process
- Railway damage
- Losses for companies
- Spike in coal prices to record \$330/ton for metallurgical coal
- Production off target by 40 mln tons in 2011

NPV: How valuation misses water costs

- “Beyond NPV” paper from University of Queensland (Evans, Moran and Brereton) at *Water in Mining* conference, Brisbane 2006
- Usually, default cost for water is purchase price
- Not accurate as energy costs (pumping supply & disposal) can outweigh price. Transport costs through pipelines often ignored when company owns infrastructure
- Also, opportunity cost: water markets in Australia
- Closure: water-related costs represent largest portion
- Desal - cost of safeguarding equipment from effects of salt water
- Externalities - costs to others; social and environmental costs



Key questions for valuing water risk

- What are the costs & benefits of site's water use, water removed from local/regional sources and cost of managing and disposing of water?
- What risks and opportunities arise when considering both internal and external values in water use?
- What values do stakeholders in other locations along the hydrological cycle realize and how does site's use impact these?

Higher water-related costs in valuation models = lower valuations.





Questions and Comments

Maureen Upton, Principal Consultant
mupton@srk.com