

WATER MANAGEMENT IN THE MINING INDUSTRY

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Real Mining. Real People. Real Difference.

Water connects mining operations with the surrounding landscape and community



Tia Maria, Peru



Investors / Insurers: Stranded assets - drying and drowning

March 22, 2015 7:20 am Investment consultants told to 'man up' on stranded assets

Sophia Grene Author alerts 🛩



Drivers of asset stranding include water scarcity

Companies in the mining, oil and gas sectors are ignoring a big risk to their valuations and predictions of future revenue.

Major risk: •23% cited drought •55% cited flooding •\$bn's projects on hold



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RISK: TOO MUCH WATER



Mount Polley Mine, 4 August 2014



Marginal cost of water management is rising



- •Water infrastructure = 10% industry CAPEX
- •US\$3.4b (2009) US\$11.9b (2013), a 350% increase.



RISK-BASED WATER MANAGEMENT

Strategic Risks



Reputational risks

Creating competitive advantage for current, future growth opportunities by maintaining investment attractiveness through strong operating performance (<u>Water is a triple bottom line metric with</u> <u>investors</u>)



Growth potential

Ability to mine new reserves is increasingly <u>linked to responsible</u> <u>stewardship of water resources</u>



Social license to operate

Water related social issues are complex and highly variable;, and, **<u>Number 1 issue in social license to operate</u>**. Mismanagement results in lack of license, significant financial impact

RISK-BASED WATER MANAGEMENT

Operational Risks



Security of supply

•Water deficiencies result in <u>lost production</u> and the <u>inability to</u> <u>adequately support expansions</u>



Excess water

•Leads to operational inefficiencies, <u>loss of mining days</u>, <u>uncontrolled discharges and increased operating costs</u>

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Water quality

•Inadequate management leads to <u>increased operating and closure</u> <u>costs</u>; water re-use opportunities may be compromised

THREE TYPES OF WATER - RELATED RISKS FOR ANGLO



EFFECTIVE WATER MANAGEMENT:

STRATEGIC AND OPERATIONAL RISK MANAGEMENT



LIFE OF MINE CYCLE: WATER-RISKS / OPERATIONAL PRIORITIES CHANGE

Feasibility	Construction	Operation	Closure
 Water supply identification/ quantification Impacts on local resources users Water supply treatment/ storage Dewatering rates/ management Storm water management Waste characterization 	 Construction water supply Surface water management Sediment control Permit compliance Waste water disposal Discharge management 	 Water supply/inventory management Water treatment Water recovery/storage/ reuse Cyanide management Dust control Site-wide water management Performance monitoring/ reporting 	 Post-mining drainage design Erosion control Water quantity/quality predictions Water treatment/ discharge strategy Facility specific closure strategies Post-closure catchment management
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IMPLEMENTATION IS ENABLED BY WATER TOOLBOX



Watershed Vulnerability Mapping (NOAA)



Water Risk Assessment Framework



Asset Management/ Reliability



Waste Management



Water Efficiency Program (WETT, Reuse, recycle, treatment)





Water Accounting/ SiteWide + BasinWide Water Balance

ANGLO AMERICAN WATER STRATEGY

•Water is an asset, not liability

•Recognize that access to water is a human right

•Committed to achieving water security for our operations and communities where we operate.

Water strategy key components:

- a comprehensive risk management approach
- a regional water management approach
- a focus on reducing, reusing and recycling the water our operations need
- investment in innovation to support our long-term ambition

Key Metrics:

- 20% reduction in abstraction by 2020
- Reuse at 75% by 2020

Our aim by 2025 our sites will recycle all available water, work effectively with our partners to become net water contributors to our communities, and work on innovative technology with the long-term aspiration that one day we may mine without water.

We have developed a water management plan for each of our sites, and our basins There is a site water management coordinator for each site, as well as a regional water management coordinator. In addition, each site develops specific projects to meet the agreed water management KPIs, which are reviewed every year.

OPERATIONAL SCALE

MANAGEMENT STRATEGY REFLECTS OPERATING ENVIRONMENT AT MULTIPLE SCALES



A practical guide to catchment-based water management for the mining and metals industry



ICMM Basin-Wide Water Management: Overview of the guide

1. AWARENESS		2. ASSESSMENT		3. RESPONSE	
Key content of this step	<u>14</u>	Key content of this step	<u>28</u>	Key content of this step	<u>47</u>
1.1 The business case for catchment-based water management	<u>15</u>	2.1 Define the operation's functional boundary and identify major issues	<u>29</u>	3.1 Understand response options to mitigate water risk	<u>48</u>
1.2 Corporate approaches to water stewardship	<u>20</u>	2.2 Understand the water issues in the catchment	<u>32</u>	3.2 Evaluate potential responses	<u>51</u>
1.3 Broader catchment activities, processes and regimes	<u>23</u>	2.3 Understand water issues across the mine life cycle	<u>36</u>	3.3 Develop a response strategy	<u>57</u>
		2.4 Understand the operation's catchment risks	<u>40</u>		
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Stakeholder engagement		Stakeholder engagement		Stakeholder engagement	
Internal action Motivate a team and assess governance	<u>25</u>	Internal action Engage cross-functional teams	<u>44</u>	Internal action Communicate strategy and promote champions	<u>58</u>
External engagement Identify stakeholders, clarify concerns and aspirations	<u>26</u>	Clarify engagement objectives and initiate iterative consultation	<u>45</u>	External engagement Communicate intentions, evaluate progress, maintain engagement	<u>59</u>





CASE STUDY

Innovatively replenishing ground water at Kolomela



THE CHALLENGE



KOLOMELA MINE

- · Operations in semi-arid Northern Cape
- Traverse underground aquifers and reach below the area's water table
- De-watering must not lower water table or deplete aquifers on which farmers depend for their livelihood

CHALLENGES

- Existing boreholes not sufficient
- Excess groundwater is generated that cannot be accommodated by the regional water service provider

VALUE TO ANGLO AMERICAN

- Secure social license to operate with local farmers, generating social value from reduced community conflict
- · Pilot with significant expansion potential
- · Increased business resilience, reduces liability

THE PROGRAMME

REPLENISHING GROUND WATER



THE RESULT



✓ 36,000m³ per month recharged

✓ 10-15% of excess mine water

✓ Quarterly community forum meetings

 Positive perception from farming community

Mining Industry Water Outlook

- Commodity demand continues to increase
- More than half of mining investment over the next decade will be in high to extreme water-scarce areas
- Water consumption is increasing at 5%+ annually
- Water management CapEx is 10-15% of total mining spend, or \$11-17 Billion pa*
- AngloAmerican:
 - Water is an asset, not liability
 - Decrease / eliminate water withdrawal
 - Minimize / eliminate wastewater discharge
 - Maximize basin-wide, community-wide programs
 - Risk-based water management is necessary