

Maximising the Impact of Mining Investment in Water Infrastructure for Communities

Ryan Admiraal Ana Rita Sequeira
Mark McHenry David Doepel

Africa Research Group
Murdoch University



Australian Government

Department of Foreign Affairs and Trade



Murdoch
UNIVERSITY

The Importance of improved water, sanitation, and hygiene in developing countries



World Health Organization

Web release WHO
27 August 2015

WHO strengthens focus on water, sanitation and hygiene to accelerate elimination of neglected tropical diseases

STOCKHOLM, GENEVA | 27 August 2015 – The World Health Organization (WHO) today unveiled a global plan to better integrate water, sanitation and hygiene (WASH) services with four other public health interventions to accelerate progress in eliminating and eradicating neglected tropical diseases (NTDs) by 2020.

“Millions suffer from devastating WASH-related neglected tropical diseases – such as soil-transmitted helminthiasis, guinea-worm disease, trachoma and schistosomiasis – all of which affect mainly children” said Dr Maria Neira, WHO Director for Public Health, Environmental and Social Determinants of Health. *“Solutions exist, such as access to safe water, managing human excreta, improving hygiene, and enhancing targeted environmental management. Such improvements not only lead to improved health, but also reduce poverty.”*

The Importance of improved water, sanitation, and hygiene in developing countries

Maximising
the Impact
of Mining
Investment
in Water
Infrastructure
for Local
Communities

Health impacts:

Table : Leading causes of death in Africa (WHO 2012).

Rank	Cause of Death	Number of Deaths	Percentage of Deaths
1	HIV/AIDS	1,088,000	11.7%
2	Lower respiratory infections	1,039,000	11.2%
3	Diarrhoeal diseases	603,000	6.5%
4	Malaria	554,000	6.0%
5	Stroke	437,000	4.7%

The Importance of improved water, sanitation, and hygiene in developing countries

Economic impacts:

- Savings in terms of health costs alone making investment in WASH cost-effective, particularly in those regions where diarrheal diseases are a leading cause of death ([Evans et al. 2004](#)).
- Less time missed from work, greater educational opportunities, and other indirect benefits from access to improved WASH increase earning potential ([Bartram et al. 2005](#)).
- Return on investment estimated to be 5-to-1 for the least developed countries ([Hutton et al. 2007](#)).

Why invest in water infrastructure for local communities?

- Mining activity frequently occurs in regions where nearby communities have insufficient access to clean water and improved sanitation.
- Mining and associated economic activity can lead to rapid population growth ([Australian Bureau of Statistics 2007](#), [Petkova et al. 2009](#), [Carrington and Pereira 2011](#)), putting pressure on existing water infrastructure and sanitation services.
- Existing water infrastructure is frequently insufficient for mining needs, so mining projects increasingly must already invest in water infrastructure to meet their own needs.
 - Over the period of 2011 to 2014 it is estimated that global spending on water infrastructure by mining companies will have doubled from \$7.7 billion to \$13.6 billion ([Global Water Intelligence 2011](#)).

Cautionary tales

The African landscape is littered with broken or derelict water points ([Improve International 2015](#)).

- **Swaziland:** 25% of macro and micro water schemes non-operational.
- **Uganda:** 80% of rainwater harvesting tanks in northern Uganda schools non-operational.
- **Ghana:** Piped water system to serve eight communities with total population of 32,000 people non-operational. 40% of boreholes installed to address this also non-operational.
- **Mozambique:** Piped water system serving town of Ribáuè (Pop.: 26,000) non-operational until replaced in 2014 (DFAT, Government of Mozambique, UNICEF).

Moral of the story: Sustainability is key.

Ensuring the sustainability of water supply

There are many factors to consider when thinking about how to deliver sustainable water supply to local communities:

- 1 Water sources and supply
- 2 Local appetite for various forms of water infrastructure, including willingness and capacity to pay
- 3 Governance/management of system
- 4 Adoption of new water technology/infrastructure
- 5 Water infrastructure capacity

1 Water sources and supply

- Carry out a census of the water sources (groundwater, surface water, desalinated water, dewatering) for that area, level of use of each of these water sources (and groundwater recharge rates, annual rainfall, etc.), currently used water infrastructure, issues with existing infrastructure, etc.
- Town of Ribáuè in Mozambique:
 - Groundwater in town, rivers with seasonal supply on town outskirts, reservoir in mountains 5 km from town with year-round supply and capacity to supply town at current population.
 - Non-operational piped water system prior to 2014, so town primarily serviced by boreholes and wells.

- 2 Local appetite for various forms of water infrastructure, including willingness and capacity to pay
 - Engage with local water regulator, council, businesses, public institutions, and households to understand their preferences.
 - A simple survey can quickly capture current community primary water point usage, willingness to pay (WTP) for new types of infrastructure, and capacity to pay.
 - Town of Ribáuè:
 - Stated preference for standpipes based on WTP survey in early 2012. Survey 6 months later suggested preference for yard taps.
 - Median actual WTP for standpipes: 0-14 MZN per month. Median actual WTP for yard taps: 30-49 MZN per month.
 - Median household income estimated at 2,500 MZN (\$62.5 USD) per month with households typically spending 10-25 MZN (\$0.25-0.63 USD) per month for borehole water.

3 Governance/management of system

- Include capacity building at every stage.
 - Training for governance of system by regulator, operations and maintenance for operator, and clear lines of communication amongst all parties involved in delivery of the water from regulator to consumer.
 - Training in running a business efficiently, developing a long-term business model, understanding cost structures of both expansion and maintenance and how to take advantage of economies of scale.
- Involve all parties early on, and implement a transition plan with final turnover to occur well before mining operations have ceased.
- Assess and, if needed, develop supply chain for parts.

- Town of Ribáuè:
 - Government water regulator (Administration of Water and Sanitation Infrastructure [AIAS]) involved from the start, and capacity building in terms of operations and maintenance included for private operator (Technical Society of Consulting and Construction [STCC]).
 - Some difficulties in transition of governance to AIAS and clear need for capacity building in terms of running a business for STCC and standpipe operators.
 - Parts for boreholes available locally. Water operator stores parts needed for general maintenance and repair of piped water system. All other parts (including water treatment materials) can be sourced from Nampula (1.5 hours by car).

4 Adoption of new water technology/infrastructure

- Market new technology (if unfamiliar to town) using multimedia, word of mouth through local leaders, and education programmes.
- Town of Ribáuè:
 - Piped water infrastructure was accompanied by massive marketing campaign.
 - Number of yard taps has roughly doubled within the first year (170 to 320) with median reported actual payments of approximately 150 MZN per month.

5 Water infrastructure capacity

- Develop a plan for expansion of network of water points, including projected costs, timelines, etc., to match population growth and demand.

Australian Bureau of Statistics (2007). Population: Mining areas boom, drought-affected areas decline. URL: <http://www.abs.gov.au/ausstats/abs@.nsf/mediareleasesbytitle/985827DA3B32F8A5CA257321001FD34E?OpenDocument>. Accessed on 30 August 2015.

Bartram, J., Lewis, K., Lenton, R., and Wright, A. (2005). Focusing on improved water and sanitation for health, *Lancet* 365:810–812.

Carrington, K., and Pereira, M. (2011). *Social Impact of Mining Survey: Aggregate Results Queensland Communities*. Technical Report, Queensland University of Technology.

Evans, B., Hutton, G., and Haller, L. (2004). *Closing the Sanitation Gap: The Case for Better Public Funding of Sanitation and Hygiene Behaviour Change*. Paris: Organization for Economic Co-operation and Development Roundtable on Sustainable Development.

Global Water Intelligence (2011). *Mining sector boom promises major boost for water infrastructure spending*.

Hutton, G., and Bartram, J. (2008). Global costs for obtaining the Millennium Development Goal for water and sanitation. *Bulletin of the World Health Organization* 86(13).

Improve International (2015). Statistics on Water Point Failures. URL:
<https://improveinternational.wordpress.com/handy-resources/sad-stats/>. Accessed on 30 August 2015.

Petkova, V., Lockie, S., Rolfe, J., and Ivanova, G. (2009). Mining developments and social impacts on communities: Bowen Basin case studies, *Rural Society* 19(3):211–228.

Szyplinska, P. (2013). *CEO 360 Degree Perspective on the Global Membrane-based Water and Wastewater Treatment Market*. Frost & Sullivan.

World Health Organization (2012). Causes of Death.

URL:

http://www.who.int/entity/gho/mortality_burden_disease/causes_death/region/en/index.html. Accessed on 30 August 2015.

World Health Organization (2015). WHO strengthens focus on water, sanitation and hygiene to accelerate elimination of neglected tropical diseases. World Health Organization: Geneva, Switzerland. URL: http://www.who.int/water_sanitation_health/events/wash-and-ntd-strategy/en/. Accessed on 30 August 2015.