



Case study briefing

The crisis of industrial water pollution and poor quality water supply

Evidence from Chingola

At a glance

Mining is a key sector in Zambia, and has contributed to poverty alleviation and national economic growth through taxes, infrastructure development, and the creation of employment. However, the sector has taken a heavy toll on the health of the environment and the population through the contamination of water resources.

In Chingola, the Kafue River and its tributaries receive highly polluted discharges of effluent from local mining operations, which contaminate the water sources of communities and lead to serious incidents of illness. Mining pollution also causes excessive siltation of rivers and streams, which has a devastating impact on aquatic ecosystems and agriculture.

The ongoing pollution of the Kafue River and its tributaries makes it nearly impossible for the water utility in Chingola, Mulonga Water and Sewerage Company, to treat water to meet ZABS drinking water quality standards, and the prioritisation of water use for the mines over domestic needs causes significant interruptions to water supply. As a result, the main domestic water supply for 108,086 of Chingola's residents has been compromised.

The protection of surface and groundwater resources against industrial pollution is vital for ensuring that economic development does not come at the expense of the long term water security of the population and the environment. Extensive legislation exists to enable responsible institutions to provide safe water supply services and protect the resource from degradation, including the Environmental Management Act 2011, the Water Resources

Management Act 2011, the Water Supply and Sanitation Act 1997, the Public Health Act and the Local Government Act. However, it is clear that those responsible for ensuring the protection and management of water resources in the interest of public health and safety are failing to deliver on their mandates.

Existing laws and regulations regarding environmental performance are relatively up to date in Zambia; the main problem for the country is that the implementation is not satisfactory – Geological Survey of Sweden (2014: 3)

The current situation in Chingola shows how important it is for our water governance institutions to be active and accountable. Addressing industrial water pollution and the poor quality of water supply in Chingola requires a well-coordinated and immediate response from the Zambia Environmental Management Agency (ZEMA), the Water Resources Management Authority (WARMA), the National Water Supply and Sanitation Council (NWASCO), Mulonga Water and Sewerage Company (MWSC), the Chingola District Council, and the Ministry of Health (MoH).

The impact of industrial water pollution

A sampling campaign of the Kafue River carried out in 2012 found that the most polluted segment of the river was located in the Copperbelt, a finding which was attributed to mining and other industrial activities in the area (ZEMA,

2012). The principle input of contamination is the Mushishima stream in Chingola, a tributary of the Kafue River, which receives overflow from the tailings retention pond and pollution control dam of Konkola Copper Mine's (KCM) Nchanga mine (O. Sracek et al, 2012).

In November 2006, a tailings pipeline ruptured, discharging highly acidic effluent with a pH of 2.8 into the Mushishima stream. Unaware of the pollution, residents along the Mushishima stream and Kafue River consumed the water and fell seriously ill. KCM was charged and found guilty of four offences related to the pollution. In a separate lawsuit, KCM were found liable for polluting the water with acidic effluent which led to the sickness of local residents, and were ordered to pay personal damages to 2,001 plaintiffs (Earth Justice, 2015).



Siltation of the Mushishima stream

The excessive siltation has a devastating impact on aquatic ecosystems and agriculture. According to the Ministry of Agriculture, farmers living near KCM's Nchanga plant suffered crop losses worth K100,300,000 during 2005 alone (SCIAF, 2007).

Siltation from the tailings has rendered our land useless – Shimulala resident



Local resident drinking from the Mushishima stream

Unfortunately, despite the legal proceedings, pollution of water resources in Chingola continues. According to an Auditor General's report in 2014, KCM operations in Chingola were found to be releasing wastewater and effluent into the environment which regularly exceeds the pollution control standards in terms of levels of total suspended solids, total dissolved solids, sulphates, copper, cobalt, manganese and iron.

Residents who depend on the Mushishima stream are still without a safe water supply. In Shimulala, for instance, boreholes which were drilled by KCM as a compensatory measure were ordered to be closed after they were found to be contaminated.

The water we drink here is not good, we are already dead – Shimulala resident

Mining activities in Chingola also severely affect waterways through excessive siltation. According to the Geological Survey of Sweden (2014), dewatering of the KCM mine contributes 15,000 tons of sediment to the Kafue river per year, and the Nchanga mining area contributes 91,000 tons per year through the discharge of tailings.

Water pollution is strictly prohibited under Section 46 of the Environmental Management Act 2011, and under Section 48 of the Act, the Zambia Environmental Management Agency (ZEMA) is given the mandate to "do all such things as are necessary for the monitoring and control of water pollution".

Despite this powerful legal mandate, ZEMA has failed to control the water pollution from mining activities. Due to a lack of capacity and resources, ZEMA is unable to carry out regular monitoring of the mines. Consequently, they have to rely on monitoring data submitted by the mining companies themselves, which is unreliable as ZEMA has no means of verifying the data (Auditor General of Zambia, 2014).

ZEMA suffers from inadequate resourcing to fulfil its mandate and has insufficient staff to adequately pursue compliance monitoring and auditing – Geological Survey of Sweden (2014: 23)

Under Section 47 of the Water Resources Management Act 2011, the Water Resources Management Authority (WARMA) is also responsible for monitoring the quality of water resources and controlling pollution in collaboration with ZEMA, and under the Local Government Act Cap 281, the Chingola District Council has the duty to take measures to prevent the pollution of water supplies.

It is critical that these responsible institutions fulfil their key roles. For example, they need to step up monitoring of water resources and effluents from the mines, and hold polluters accountable to ensure that residents and water utilities can use the resource safely and sustainably.

Insufficient and poor quality water supply

The Water Supply and Sanitation Act No. 28 of 1997 requires water supply and sanitation utilities to provide efficient and sustainable water supply and sanitation services under the regulation of NWASCO.

Chingola's water supply is provided by Mulonga Water and Sewerage Company (MWSC). MWSC operate two water treatment plants in Chingola, one of which is located along the Kafue River, and the other which is located within KCM's Nchanga mine. The raw water supply for the MWSC treatment plant at Nchanga mine is a reservoir which is operated by KCM and also used in their operations. The reservoir receives a mixture of water which is pumped out of the open pit mine, and water from the Kafue River.



Water reservoir at MWSC KCM treatment plant

KCM receive a 16% reduction on their tariff to MWSC for providing the water, despite the fact that use of water from the reservoir is prioritised for the mine over the MWSC treatment plant. If the level of water in the reservoir drops, the raw water supply for MWSC is cut off. This happens frequently.

We have no control of the source... basically we get what the mine wants to give us that day – Mulonga Water and Sewerage Company staff member

The prioritisation of water for the mine's operations over the MWSC treatment plant causes significant interruptions to water supply for the 47,036 residents served by the plant.

There are times when we stay without water from 6:00 hrs to 18:00 hrs in a day, and sometimes we even go four days without water – Mushishima resident

This situation is in direct contravention of the Water Resources Management Act 2011, which stipulates under Part I Section 6(b) that, "water is a basic human need and as such domestic and non-commercial needs shall enjoy priority of allocation use".

When water is provided in Chingola, it is of poor quality. MWSC's sources of raw water are highly susceptible to industrial pollution, and as a result the utility struggles to treat it to meet ZABS drinking water standards.

What the mines discharge is not good enough for the water treatment plants to treat – ZEMA Inspector

Water quality data obtained from MWSC for the period of January 2010 up till June 2015 shows levels of copper, turbidity, manganese, iron, cobalt and residual chlorine which violate ZABS drinking water standards significantly and repeatedly over the five and half year period at MWSC's KCM water treatment plant (Figures 1-6), and to a lesser extent at their treatment plant on the Kafue River.

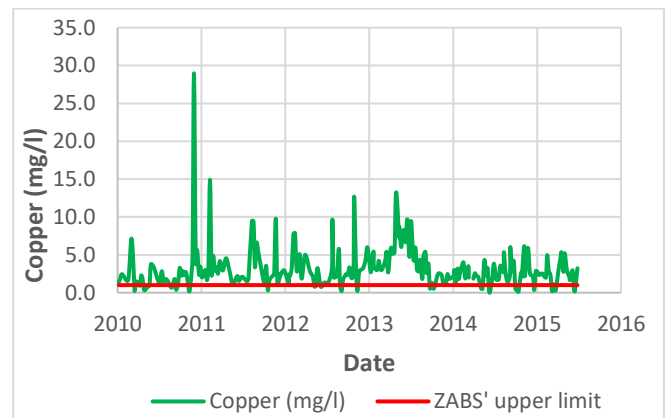


Figure 1: Copper levels in treated water from KCM water treatment plant 2010-2015

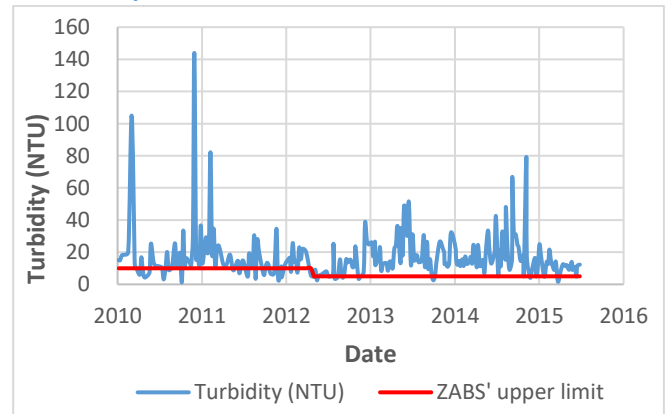


Figure 2: Turbidity of treated water from KCM water treatment plant 2010 - 2015

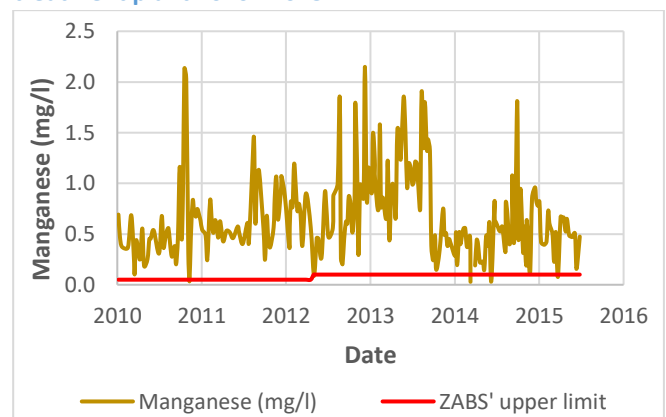


Figure 3: Manganese levels in treated water from KCM water treatment plant 2010-2015

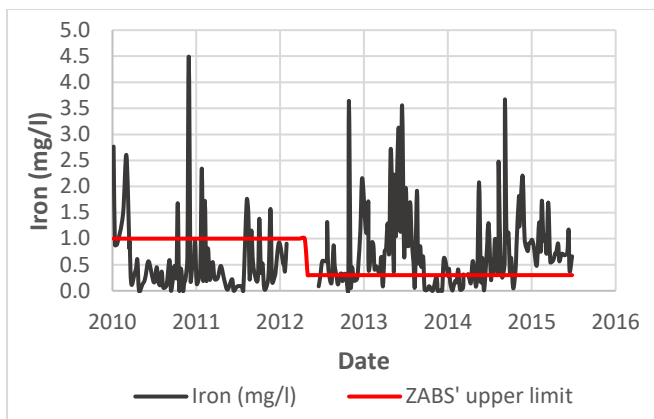


Figure 4: Iron levels in treated water from KCM water treatment plant 2010-2015

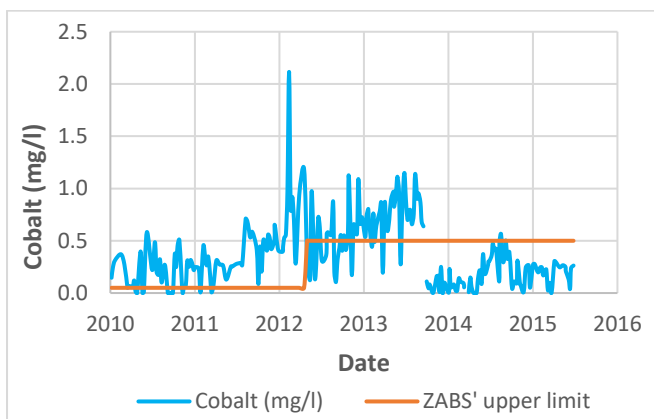


Figure 5: Cobalt levels in treated water from KCM water treatment plant 2010-2015

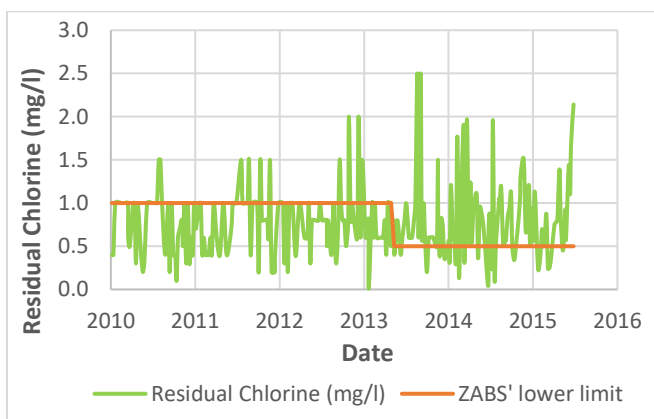


Figure 6: Residual chlorine levels in treated water from KCM water treatment plant 2010-2015

Consumption of the water poses unacceptable health risks to consumers. Excessive levels of copper in the body can result in a number of negative health effects including liver and kidney damage, anaemia, immunotoxicity and developmental toxicity (Agency for Toxic Substances & Disease Registry, 2004). High levels of turbidity and low levels of residual chlorine reduce the effectiveness of disinfection. Additionally, high levels of turbidity and manganese change the colour of the water, affecting the acceptability to consumers.

What needs to change?

The situation in Chingola highlights the importance of accountable institutions for the effective implementation of water management law and policy. Addressing the issues of industrial water pollution and water supply provision requires a well-coordinated, immediate and time-bound response from the responsible institutions including ZEMA, WARMA, NWASCO, MWSC, the Chingola District Council and the Ministry of Health. In order to improve the situation, it is recommended that:

Locally:

- ◊ NWASCO must ensure that MWSC find a solution to secure an uninterrupted source of raw water at their treatment plant at Nchanga mine in order to provide an uninterrupted water supply for customers.
- ◊ MWSC must mobilise funding to invest in the necessary improvements at both of their water treatment plants in Chingola in order to treat water to meet ZABS drinking water standards.
- ◊ The Chingola District Council needs to mobilise funding through the Ministry of Local Government and Housing to invest in the improvement of rural water supply in areas affected by industrial pollution, such as Shimulala and Hellen. As a first step it is recommended that the Council undertake a feasibility study in order to determine the most appropriate means of providing a safe water supply for these communities.
- ◊ The Chingola District Council must fulfil its mandate under the Public Health Act to prevent the pollution of water supplies in Chingola. A potential first step would be the establishment of a lab and sampling regime in collaboration with the Chingola District Health Office.
- ◊ The Ministry of Health (MoH) through the Chingola District Health Office should improve water quality monitoring by testing for physio-chemical parameters in addition to bacteriological parameters, and undertake comprehensive water safety planning in communities in order to assess and manage risks to water supply. Additionally, the MoH should advocate, and collaborate with other institutions for the adequate provision of water supply services.

Nationally:

- ◊ ZEMA needs to step up the monitoring of water effluents from mines, enforce the conditions of discharge permits and hold polluters accountable. Given the current resource constraints, one way of achieving this may be through the installation of automatic monitoring stations. Automatic monitoring stations could also form the basis of early warning systems and emergency response plans in the case of leakages and spillages of industrial effluent.
- ◊ WARMA, in cooperation with ZEMA, should monitor the quality of water resources and ensure that standards are maintained, especially in areas which are vulnerable to industrial water pollution.