

Distribution and aquatic ecotoxicological risks of metal(loid)s in surface sediments of headwater streams on the Central African Copperbelt

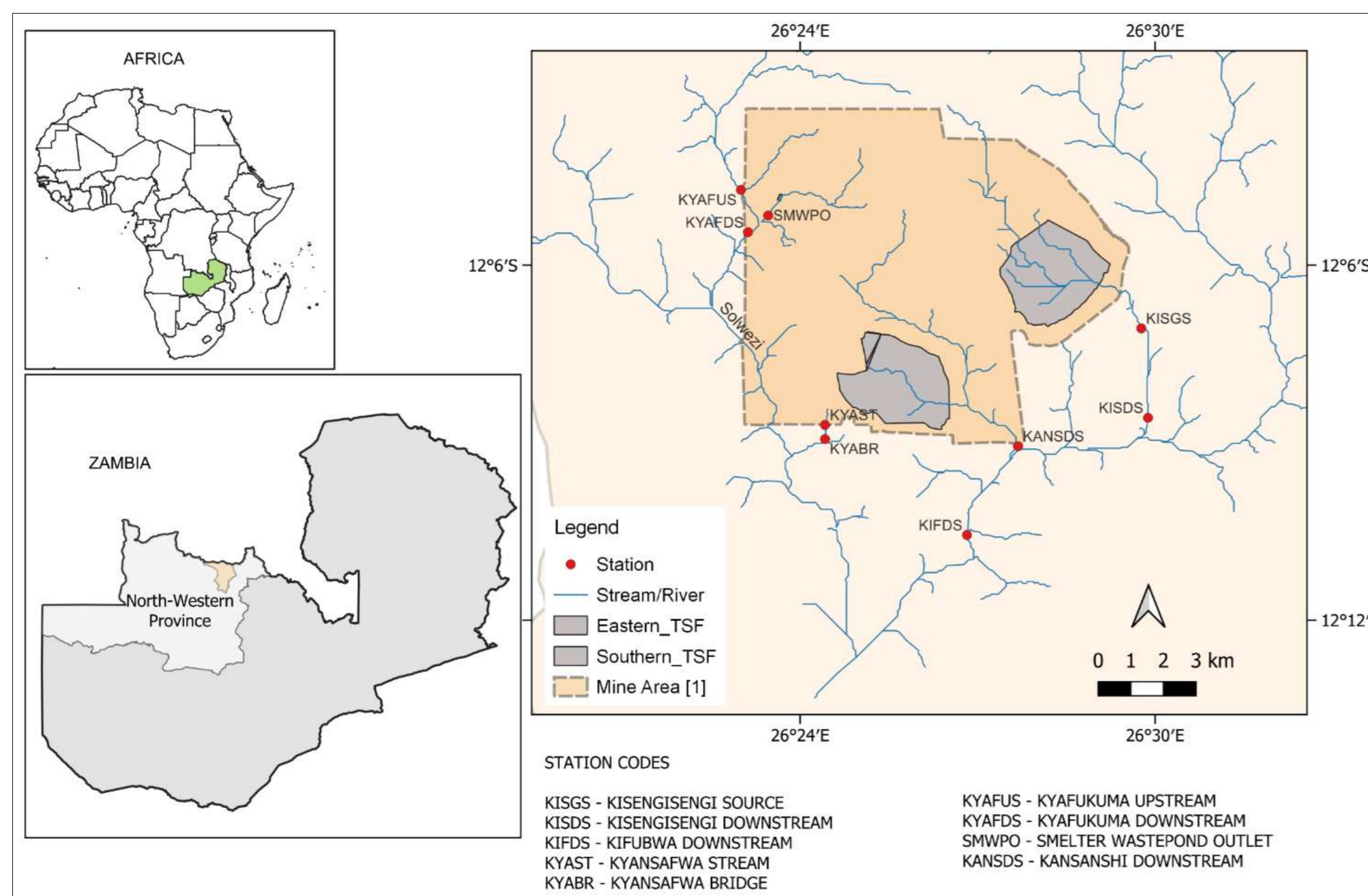
Kennedy O. Ouma *, Agabu Shane, Concillia Monde & Stephen Syampungani
Copperbelt University, Zambia

INTRODUCTION & AIM

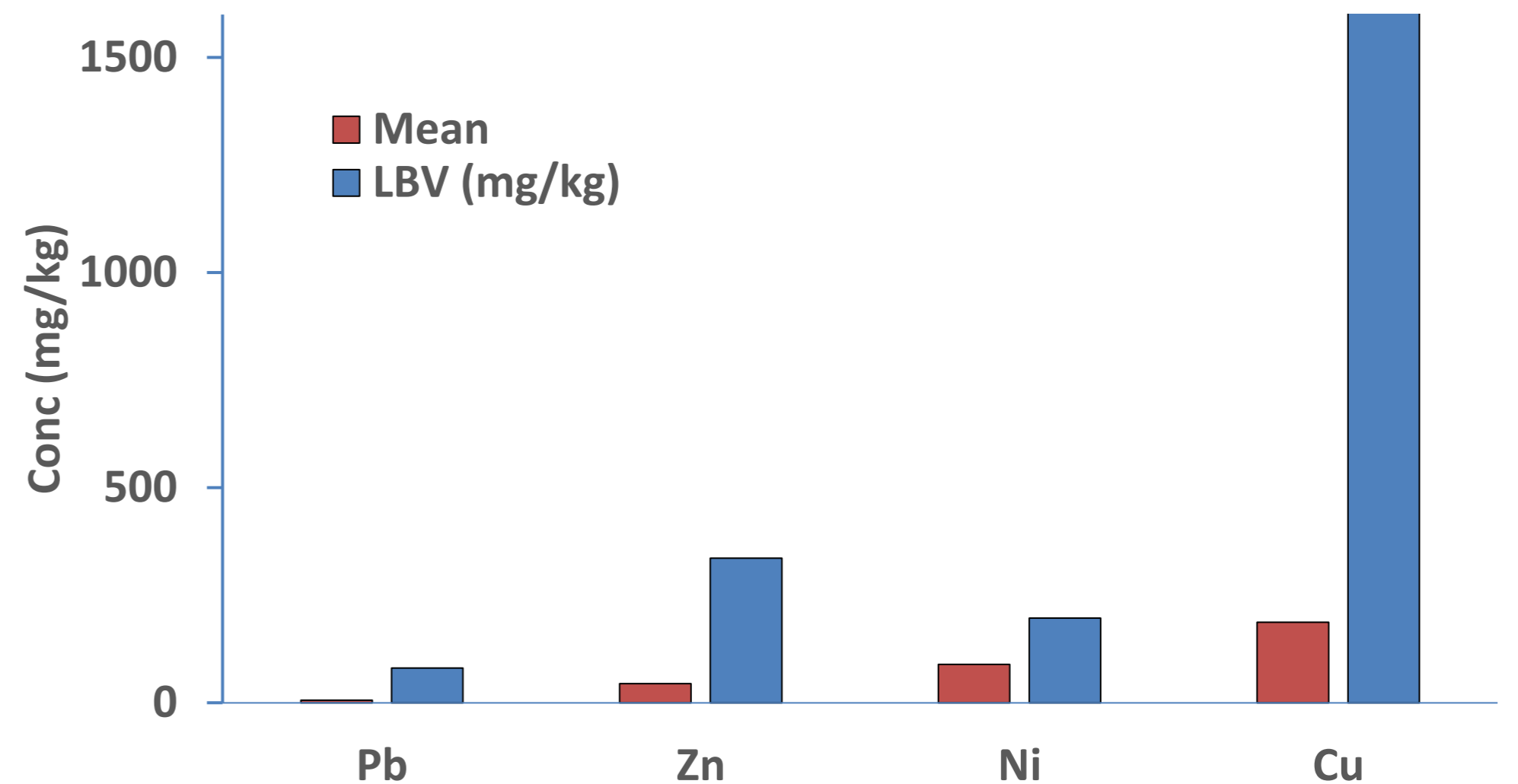
- Globally, stream ecosystems experience alarming anthropogenic mining pollution (Rani, 2022), threatening the attainment of “2030 UN-SDGs 6 and 14”.
- In sub-Saharan Africa, the Cu-Co rich Central African Copperbelt (CACB) is characterised by intensified mining, industrial expansion and rapid population growth (Ouma et al., 2022).
- The study was conducted in the north-western Zambian section of the CACB from May 2022 - April 2023 to investigate the spatial distribution and ecotoxicological risks of As, Cr, Cu, Ni, Pb, and Zn in stream sediments.

METHOD

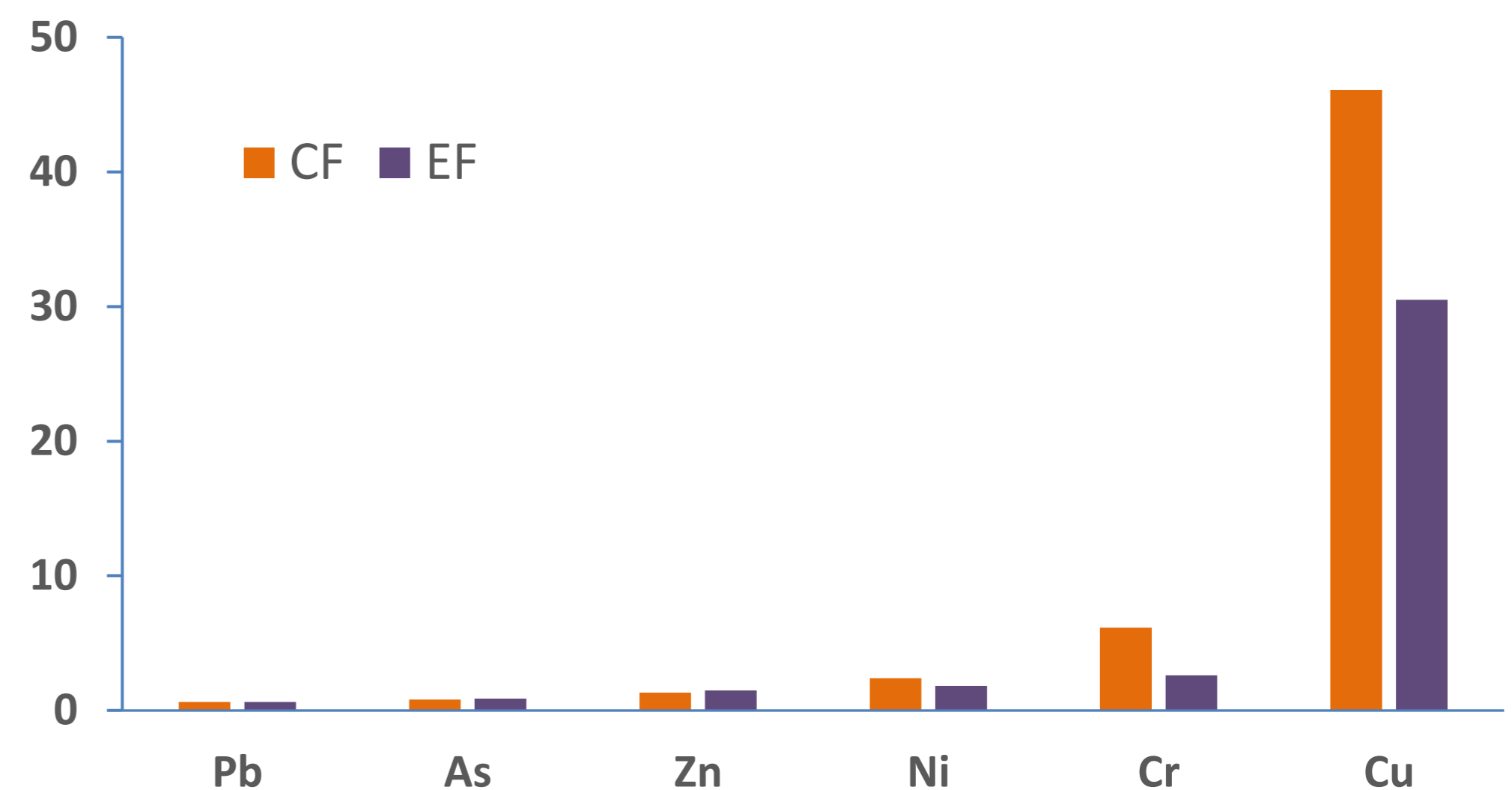
Study area: North-western Zambian Copperbelt



RESULTS & DISCUSSION



- Mean concentrations (mg/kg) in stream sediments were below the local background values (LBV): As (5.27) < Pb (5.75) < Zn (44.6) < Ni (89.3) < Cu (187.5).



- “Low-to-moderate” to “very high” contamination [Pb (0.63) > As (0.81) > Zn (1.33) > Ni (2.39) > Cr (6.16) > Cu (46.01).
- “None-to-minor” to “very severe”, with increasing enrichment (EF) [Pb (0.64) > Zn (0.89) > As (1.48) > Ni (1.82) > Cr (2.59) > Cu (30.45).
- “Low ecological risk” (mPERI 41.7-47.4), while the toxicity risk index (TRI, 13.1-19.3) depicted “moderate-to-considerable” ecotoxicological risk to benthic biota.

CONCLUSION

While the overall ecotoxicological risk was considerably low, proactive interventions must be instituted to mitigate anthropogenic metal pollution for the effective and sustainable management of CACB stream ecosystems.

FUTURE WORK / REFERENCES

Rani, L., Srivastav, A.L., Kaushal, J., Grewal, A.S., Madhav, S., 2022. Heavy metal contamination in the river ecosystem, <https://doi.org/10.1016/B978-0-323-85045-2.00016-9>

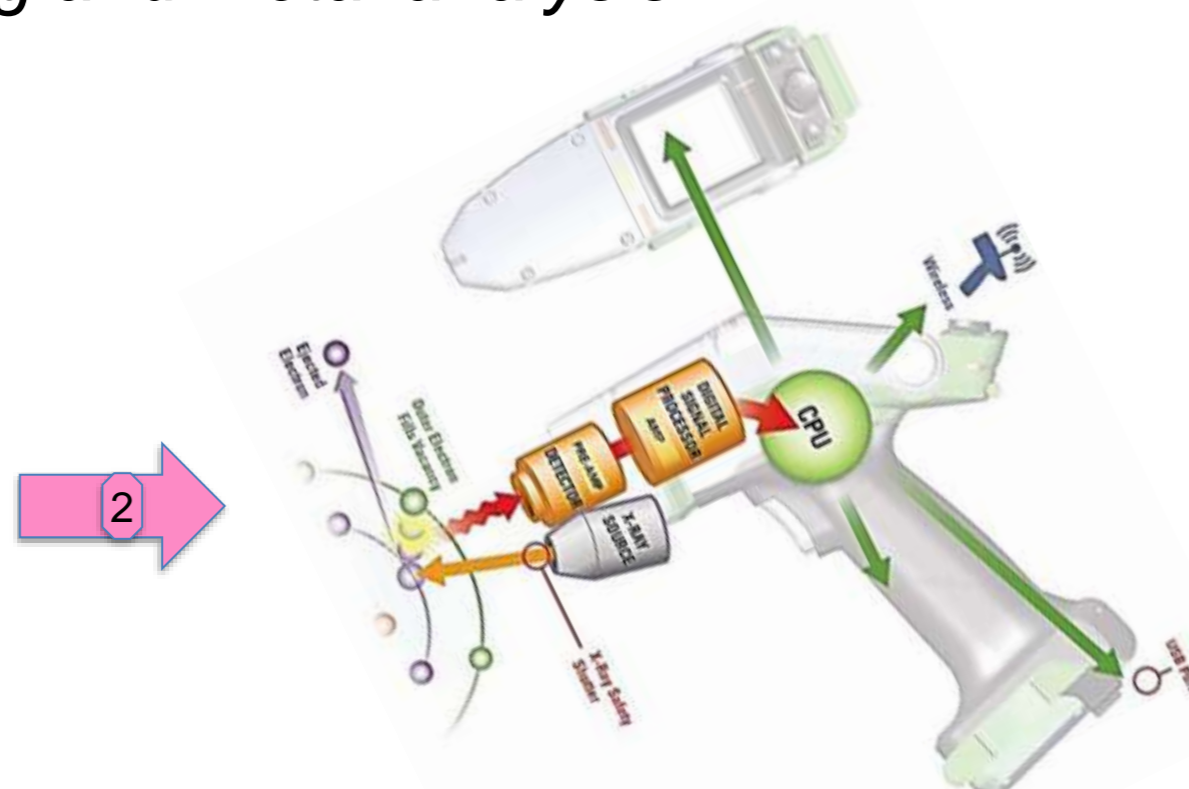
Ouma, K., Shane, A., Syampungani, S., 2022. Aquatic Ecological Risk of Heavy-Metal Pollution Associated with Degraded Mining Landscapes of the Southern Africa River Basins: A Review. Minerals 12, 225. <https://doi.org/10.3390/min12020225>

Stream sediment processing and metal analysis



1

Drying, sieving and packaging



XRF analysis