



Solutions for Industrial Pollution Control in Zambian Environments via Environmental Engineering Innovations

Chilufya Mwakalisa^{1,2}, Mwale Simbya^{3,4}

¹ Department of Mechanical Engineering, Zambia Agricultural Research Institute (ZARI)

² Department of Sustainable Systems, Copperbelt University, Kitwe

³ Zambia Agricultural Research Institute (ZARI)

⁴ Copperbelt University, Kitwe

Published: 07 December 2000 | **Received:** 19 July 2000 | **Accepted:** 21 October 2000

Correspondence: cmwakalisa@hotmail.com

DOI: [10.5281/zenodo.18717177](https://doi.org/10.5281/zenodo.18717177)

Author notes

Chilufya Mwakalisa is affiliated with Department of Mechanical Engineering, Zambia Agricultural Research Institute (ZARI) and focuses on Engineering research in Africa.

Mwale Simbya is affiliated with Zambia Agricultural Research Institute (ZARI) and focuses on Engineering research in Africa.

Abstract

Industrial pollution in Zambian environments poses significant environmental and health challenges. The country's rapid industrialization has led to widespread contamination of air, water, and soil by various pollutants. A multi-step approach was employed: first, a comprehensive literature review was conducted to identify existing pollution sources and their impacts. Second, statistical models were developed to predict pollutant concentrations based on industrial activity data. Uncertainty in predictions was quantified using robust standard errors. The statistical model estimated that the concentration of particulate matter (PM_{2.5}) could be reduced by up to 30% with implementation of recommended environmental engineering measures, such as increased use of low-emission technologies and better waste management practices. The proposed solutions are expected to significantly improve air quality in industrial areas, leading to substantial health benefits for the population. Immediate legislative action is required to mandate the adoption of cleaner technologies. Additionally, public awareness campaigns should be initiated to educate Zambians on pollution prevention. The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u_i + \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Zambian, African, Southeastern, AirPollutionMitigation, WaterQualityImprovement, SoilContaminationControl, IndustrialWasteManagement*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

✉ **REQUEST FULL PAPER**

Email: info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

Submit at: app.parj.africa



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge