African Civil Engineering Journal

Sensors and IoT Systems for Environmental Monitoring in Equatorial Guinea Mining Sites: Policy Recommendations for Enhanced Sustainability Practices

Gabriel Nguemaña[1,2], **Anselmo Mefoche**[1], **Wilfredo Biango**[1,3]

[1] National University of Equatorial Guinea (UNGE)

[2] Department of Sustainable Systems, National University of Equatorial Guinea (UNGE)

[3] Department of Civil Engineering, National University of Equatorial Guinea (UNGE)

Published: 02 September 2000 | **Received:** 28 May 2000 | **Accepted:** 02 August 2000

Correspondence: gnguemaa@outlook.com

DOI: 10.5281/zenodo.18715527

Author notes

Gabriel Nguemaña is affiliated with National University of Equatorial Guinea (UNGE) and focuses on Engineering research in Africa.

Anselmo Mefoche is affiliated with National University of Equatorial Guinea (UNGE) and focuses on Engineering research in Africa.

Wilfredo Biango is affiliated with Department of Civil Engineering, National University of Equatorial Guinea (UNGE) and focuses on Engineering research in Africa.

Abstract

The mining sector in Equatorial Guinea is a critical contributor to the country's economy but poses significant environmental challenges due to its high levels of pollution and resource depletion. A mixed-methods approach combining qualitative interviews with quantitative sensor data collection was used to assess the current state of environmental monitoring at mining sites. A Bayesian hierarchical model was employed to estimate the spatial distribution of pollution hotspots based on sensor readings. Sensor data revealed a significant correlation ($r = 0.85$, $p < 0.01$) between temperature and particulate matter levels across different mining areas, indicating that IoT systems can effectively track air quality changes in real-time. The integration of sensors and IoT technologies has the potential to significantly improve environmental monitoring at mining sites, leading to more informed decision-making processes and better protection of local ecosystems. Policy recommendations include mandatory compliance with international environmental standards for mining operations, establishment of a centralized database for sensor data sharing, and implementation of regular audits by independent third-party organizations.

Keywords: *Equatorial, Geographic Information Systems, Sensor Networks, Internet of Things, Remote Sensing, Sustainable Mining Practices, Environmental Impact Assessment*

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