Eco Watch Uganda: Leveraging AI and Citizen Science for Environmental Monitoring in Resource Constrained Settings

Rebecca Abitimo and Kambugu William (Uganda)

Key words: Access to land; Bridge surveying; Cadastre; Capacity building; Deformation measurement; Digital cadastre; Education; e-Governance; Engineering survey; Geoinformation/GI; GNSS/GPS; Implementation of plans; Land management; Low cost technology; Remote sensing; Risk management; Security of tenure; Young surveyor; Environmental Monitoring; Geospatial Analytics; Early Warning Systems; Community Reporting

SUMMARY

Uganda continues to face severe environmental degradation, including deforestation (approx. 200,000 hectares are lost annually [NFA, 2023]), poor solid waste management (Kampala generates approx. 2,800 tons/day with only 40% collected [KCCA,2023]), unregulated sand mining, and water pollution affecting over 40% of Lake Victoria's shoreline. Climate induced hazards such as River Nyamwamba floods Kaseses, have displaced over 120,000 people in the past decade. Existing monitoring mechanisms are centralized and reactive, leaving a critical gap between citizens observing environmental threats and institutions mandated to act.

To bridge this gap, we came up with EcoWatch, an AI enabled citizen reporting system that transforms communities into active participants in environmental governance. The platform integrates geotagged citizen reports (photos, videos, audio, text) with artificial intelligence classifiers for real time validation, categorization and prioritization. Computer vision models detect illegal tree felling, sand mining and waste accumulation, while audio analytics identify chainsaw or heavy machinery operations. Natural Language Processing translates and standardizes reports submitted in local languages (Luganda, Runyankole, Acholi). Reliability is enhanced through cross verification with satellite derived land use change data via Google Earth Engine, and a crowd validation system filters false reports.

Kasese District, experiencing recurrent floods and high deforestation rates (Approx. 35% forest loss in 10 years in Rwenzori foothills), is one of the selected pilot areas. The pilot will engage 100 trained citizen reporters, local councils and school eco clubs. NEMA and other relevant authorities will access real time dashboards and early warning modules. USSD/SMS integration ensures accessibility for Uganda's 70% mobile penetrated population, including non-smartphone users.

Expected outcomes include: (i) a cost-effective model for decentralized environmental monitoring, (ii) Improved citizen – government accountability, (iii) District Level geospatial dashboards supporting early action, (iv) a scalable framework for nationwide replication. Eco Watch Uganda demonstrates the feasibility of converging citizen science, AI and geospatial analytics to establish a pro-active, data driven environmental early warning system.