2nd International Conference on

GIS AND REMOTE SENSING

October 02-03, 2017 Vienna, Austria

Enhancing mine planning in Kenya - developing a spatial decision support system using a systems approach

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Since 2013, mining has taken on a new strategic significance in Kenya's development blueprint with the aim of increasing its contribution to the GDP, from 1% to double digits. After 76 years of operating under an outdated mining law, Kenya launched a new Mining Act in 2016. Considered the most progressive mining law in Africa, it presents a regulatory model for transforming the management of mineral resources and associated social and physical environment. Operationalising the new mining regulations, however, invokes critical questions of exactitude. Stakeholders need assurance of spatial integrity in the mining cadastre and the metrics of performance, rights allocation and impacts. Investors desire productivity, safety and a well-regulated operating environment. Model-Based Systems Engineering finds various applications in a mine's life cycle, but on a limited spatial scale. The weakest, and often the missing link in the global analytics characterising similar models, is the lack of comprehensive spatial metrics. Therefore, not only is it imperative to develop discrete mining plans for project-specific loss and risk mitigation but even more critical is the need to develop replicable system models capturing the big picture of spatially verifiable rights, interests and impacts. Convergence in positioning, navigation and mapping technologies enhances the generation of precise spatial metrics for structural geospatial modelling. Using a Kenyan case study, this research applies GIS and system dynamics to develop a spatial decision support system. The model integrates multi-layer spatial datasets with factual criteria from stakeholders and regulations. It allows for region-specific modification in imperative and convenience criteria.

Biography

Nashon J Adero is researching on Mine Surveying (PhD) at the Technische Universität Bergakademie Freiberg, Germany. He has acquired cross-sector experience in the surveying and mapping industry, public service and academia. He has held positions of Tunnel Surveyor, Policy Analyst at Kenya's leading public policy think tank, and Manager in the Geomatics industry. He delivered lectures on Surveying and GIS at Taita Taveta University, Kenya. His publications have focussed on environmental modelling, spatial planning and cross-cutting policy research. He is a member of professional bodies and networks, including the Institution of Surveyors of Kenya (ISK), System Dynamics Society, and Kenya DAAD Scholars Association.

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