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Application of RESRAD and ERICA tools for safe and sustainable gold mining in Nigeria.

Gold mining in Nigeria has had a significant socioeconomic impact, contributing to the country's GDP and providing employment opportunities. However, the sector has also been associated with radiological health risks. The government has implemented policies to regulate the sector but challenges remain in terms of sustainability because the policies are less pragmatic considering the economic realities of the country. In this study, state-of-the-art computational tools - RESRAD ONSITE, RESRAD OFFSITE and ERICA were applied to a typical representative artisanal goldmining area in Nigeria, in an attempt to assess radiological and ecological risk to guide policy makers towards sustainable gold mining decisions. Results indicated that the total doses and cancer morbidity risks for an offsite resident farmer is within the radiation basic safety limit, while for onsite resident farmers they were greater than the limits. For non-human biota conservation, the hazard quotient was estimated and found to be less than unity, and the total dose rate per organism was less than the screening dose of $10\mu\text{Gy h}^{-1}$, which demonstrated that the risk is acceptably low. It was concluded that risk communication and sensitization will ensure sustainable mining.

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