

## Artisanal miners, weather-driven hazards considering physical and hydrological water management processes

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This research is about development minerals, which have important implications for sustainable development, yet they have to date received inadequate attention as potential to impact livelihoods. Development minerals include: gypsum and salt, construction materials, like sand and gravel, dimension stones, like marble and granite, and semi-precious stones, like garnet and tourmaline. The data for the research was collected in 5-days data from 40 trainers on environment, community and health and safety in the development minerals respondents, conducted in central Uganda, Entebbe district.

The objective was to improve understanding and building the capacity of key vulnerable stakeholders about the physical processes and related non-stationarities characterizing weather-driven hazards of water resources in mineral deposits. The specific objectives also were: to increase the awareness of environment, community, and health and safety issues and challenges; facilitate in-country knowledge exchange on the practices and governance arrangements necessary for the sector to contribute to inclusive and sustainable development; and build the capacity of individual stakeholders through participation and the preparation of return-to-work plans.

The methodology included the participatory approach, adult learning methodologies, including a mixture of technical presentations, participant knowledge sharing, case studies, field visits, group discussion, and role-plays. The participatory learning methodologies were selected because there are appropriate for adult learning and could be appropriate for uneducated respondent or people of low understanding.

The findings revealed the knowledge gap among artisanal miners about the physical processes and related non-stationarities characterizing weather-driven hazards of water resources in mineral deposits, such as climatic drivers hazards and related hydrological processes.

The study also revealed that the development mineral sector should be driven with the overriding objective of identifying how mining and minerals can best contribute to the transition to sustainable development. With regards to mineral exploration and related impacts, artisan miners need to be supported to evaluate a mineral deposit's economic potential by comparing expected revenues from mineral production with associated expected health costs and environmental protection, as well as national development and production.

Lastly, there is need for Governments (such as in developed and developing countries) to improve on precautionary measures in the vulnerable communities. Promote gender concerns in the development minerals sector by taking care of the practical needs of women and design of advocacy and awareness raising activities aligned to division of labour. Develop policy measures to reduce the knowledge gap among artisanal miners about the physical processes and related non-stationarities characterizing weather-driven hazards, such as climatic drivers hazards and related hydrological processes.