Re-imagining the potential of constructed wetlands as a sustainable solution for mining pit lake
Closures

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South Africa has a significant number of mining pit lakes, most of which are the consequence of surface mining operations. Of these, 200 are the remarkable product of more than two centuries of coal mining. When left unrehabilitated and without post-closure land uses, these lacustrine water bodies are frequently associated with high concentrations of metals, variable salinity, low to high pH levels that contribute to poor water quality with subsequent negative impacts on aquatic ecosystem and planned land uses, which could include agriculture, recreational and energy generational activities. However, various rehabilitation options exist and one such option is the unexplored ad inexpensive potential of constructed floating wetlands. Various scholars, and practitioners revealed that this could offer sustainable solutions to post-closure mining pit lake land uses. This can be accomplished by establishing floating wetlands with vetiver grass, which has demonstrated ecological and environmental potential. Some of these potential benefits include reduced evaporation, which raises pit lake water levels, improved water quality, and the creation of habitat for the establishment of water-related ecosystems, which in turn attracts a diversity of resident and migratory bird species due to the abundance of food and breeding opportunities. The resulting productive and integrated ecosystem could further deliver an array of ecosystem services, entrepreneurial opportunities within renewable energy sector and overall societal benefits. In order to assess the various rehabilitation options, re-imagined constructed floating wetland trials were established at Voorspoed Mine in 2022. Positive outcomes from the trial's preliminary findings include, but not limited to improved water quality, a greater diversity of birds and other aquatic flora and fauna, enhanced aesthetics, and the potential to employ Vetiver for the synthesis of essential oils and bioenergy.