IM4DC

Action Research Report

SUMMARY

Researchers:
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School/Centre:
Centre for Mined Land Rehabilitation

University/Institutions:
Sustainable Minerals Institute
The University of Queensland
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Key themes:
Community and Environmental Sustainability

Key countries:
Indonesia

Completion:
March 2015

Research aims:
This research sought to address the following questions:

- How can wetland plants decrease elevated pollutants in nickel mine drainage entering a mesocosm wetland?
- What types of wetland plants were growing in the wetland and what was their response to the mine drainage?
- What types of materials were the most efficient in removing certain pollutants from the mine drainage?
- What were other factors influencing the removal rate of certain pollutants from the mine drainage?

For further information on this action research:
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Research paper available from author:
R. Amin, M. Edraki, D.R.Mulligan and T.H. Gultom (2015). Chromium and nickel accumulation in the macrophytes of Kawasi Wetland in Obi Island, North Maluku Province, Indonesia. Australian Journal of Botany (In Press)

The Response of Wetland Plants to the Geochemical Conditions of Discharged Water from Nickel Mining Operations in Eastern Indonesia

Mining industries have developed significantly for the last two decades including in Indonesia. In nickel laterite mines, the wastewater can potentially contain chromium, including hexavalent chromium, which is toxic to biota. On the other hand, the environmental management is not simple and cheap. Therefore, discovering a technology for treating contaminated mine water, that is inexpensive and effective for the mining industry, is important. Several studies concluded there is a possibility of chromium reduction in mine drainage passing through certain wetland systems.

The purpose of this research project was to identify the essential wetland conditions determining the success of chromium removal from the discharged waters at nickel laterite mines in tropical climates of Indonesia. In a wetland, three main components are found; namely the plants, the sediment and the water, all responding to environmental conditions.

Two native macrophytes were tested in mesocosm wetland and it was found that *Machaerina rubiginosa* (Spreng.) T. Koyama (Fam. Cyperaceae) performed better than others in removing chromium from mine water. Other aspects of wetlands, such as the residence time and type of wetland matrix were critical in the efficiency of the chromium removal.

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