Title:
Concentration reduction and evapotranspiration effect of leachate containing heavy metals by phytoremediation

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Abstract:
When excavated soil and rock are temporarily stored at civil engineering construction sites, rainwater or snowmelt that leaches from such soil and rock may be contaminated by heavy metals. In this study, an artificial channel experiment in which water containing arsenic was purified by using mat shaped plants named Eleocharis acicularis. Two sessions of artificial flow were implemented by leading 100 L of mine drainage water containing 7.45 mg/L of arsenic into the channel each time. The arsenic concentration in the Eleocharis acicularis was measured using samples collected at 0 m, 25 m, and 50 m along the channel. And to determine the evaporation rate of water from Eleocharis acicularis and from the artificial channel, tap water was poured into the channel five times over 5 days. A total of 500.0 L of tap water was used. As a result of experiments, the arsenic content in the Eleocharis acicularis increased with increase in the number of water inputs, and the arsenic content in the Eleocharis acicularis was higher at the upper reach of the channel and lower at the lower reach. The total concentration of arsenic in E. acicularis is equivalent to 40 % absorption of the total content of arsenic in the mine drainage used for the experiment. The volume of water was reduced due to evapotranspiration by 64 % when the average air temperature was 25 °C or higher, and by 41 % when the average air temperature was 15 °C or lower. The reduction rate of the water volume per unit area per hour was 1.1 L/m2/h when the average air temperature was 25 °C or higher, and it was 0.2 L/m2/h when the average air temperature was 15 °C or lower.