Challenges to Monitoring Groundwater Contaminants in Riparian & Terrestrial Vegetation

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In recent years, there have been improvements to environmental monitoring approaches for large scale industrial activities including mining. Efforts have focused on developing scientifically rigorous, defensible objectives and guidelines for surface water, waste, air and sediment monitoring. However, the development of guidelines for monitoring impacts on vegetation has lagged compared to other programs. We review the challenges and opportunities around designing strategies for effective monitoring and detecting of sub-lethal change in vegetation communities as a result of groundwater impacts.

Mining influences on vegetation are multi-fold. A primary mechanism, however, is through changes in groundwater quantity and/or quality. Both terrestrial and riparian communities can be impacted by changes in groundwater levels by dewatering/extraction activities, impoundments and, changes in groundwater quality through leaching of contaminants into shallow groundwater. These physical and chemical changes to groundwater can have major influences on groundwater dependent vegetation communities leading to altered community composition, structure and health.

Whilst there are a range of methodologies that measure baseline vegetation community structure there is little in the way of standardised methodologies designed to detect the chronic or sub-lethal impacts of groundwater change and/or groundwater contaminants. Furthermore, many of these impacts are often set against a background of historical legacy mining impacts, other land uses and high climatic variability. As such, identifying causal linkages between mining activity and vegetation change can present considerable challenges.