Determination of stream sediment background concentrations in mineralised catchments impacted by mining using Tellus data from Northern Ireland

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Introduction

The naturally elevated background concentrations of metal(loids) in stream sediments and water from mineralised catchment can be retrospectively discriminated from the impacts of ore extraction and processing by using geochemical survey data. We present a methodology to derive baseline data using a subset of the Tellus geochemical stream sediment survey database.

Requirement for baseline data

- Improve assessment of the environmental pressures due to mining to inform the implementation of the European Mine Waste Directive and the Water Framework Directive.
- Increase understanding of what restoration goals are achievable in mining impacted catchments.
- Provide a reference against which changes can be measured and can be used in future mine applications.

Method: data exploration

Stream sediment sample data were selected where they overlite Ordovician or Silurian sediments, coincident with many of the high Pb concentrations shown above. This area has had historic mining activities, especially those of the south Armagh – Monaghan mining district.

Method: using statistical data properties to separate data populations

The table above shows the summary concentrations of the data for the sites mapped to the left. These show the full range, interquartile range (25th and 75th percentiles) and the median (50th percentile).

In the absence of sediment quality guidelines, comparison of the selected dataset is made to the Canadian sediment Predicted Effects Level (PEL) – where statistical values exceed the PEL these are highlighted in bold.

The use of baseline concentration

Systematically sampled regional geochemical data can be used to derive local background concentrations, related to the bedrock composition and specific catchments. This may provide guidance on feasible restoration targets where there is localised contamination.

The most widespread high concentrations are found in southern Counties Armagh and Down.