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The geochemical quality of soils in the Clyde basin, Scotland, UK – main controls and anthropogenic impacts

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The distribution of potentially harmful substances in soils is of growing concern under current environmental protection legislation because of their potential impacts on water quality, ecosystem and human health. Equally there are concerns over food security and the ability of soils to provide essential trace elements and nutrients to agricultural crops and animals. Recently, the British Geological Survey's (BGS) Geochemical Baseline Survey of the Environment (G-BASE) project carried out extensive surveys of rural and urban soil quality in the River Clyde catchment (Clyde basin) on the west coast of Scotland. The Clyde basin is interesting as it extends from a rural upland environment in the south, to the River Clyde estuary in the north. The catchment contains an historic lead mining area known as Leadhills that was active until the mid 20th century. In addition, the estuary and lower reaches of the river formed the transport and shipping links that drove the development of Scotland's main conurbation – the city of Glasgow, which is centred on the River Clyde. Glasgow was a major industrial powerhouse during the 18th-20th centuries and a centre for coal mining, shipbuilding, metal manufacture and heavy engineering. Although heavy industry and mining have now declined, the newly available G-BASE soil datasets demonstrate the impacts of urbanisation and the post-industrial legacy of the Glasgow conurbation as well as of historical mining activities on environmental quality. The survey results reveal metal concentrations in urban soils are typically up to 2.5 times (median values) that of rural soils as a result of pollution. Conversely, the distribution of essential trace elements for agriculture such as selenium and iodine are largely controlled by natural processes. The data allow for better assessment of soil-quality related risks to ecosystem and human health to aid land management and environmental protection in the heavily populated River Clyde catchment.