

The South Wales Coalfield is structurally and lithologically complex. Attempts to understand the regional groundwater flow system have been largely piecemeal, focusing on single collieries or groups of collieries. Inspection of both historical data, gathered during the active mine dewatering phase of the coalfield, and of contemporary post-mining groundwater rebound data, allows a picture of the whole groundwater flow system to be derived, along with the regional water balance. The assessment is aided by application of a 3D visualization model of the geological framework, which includes the piezometry during and after the mining phase and pumping and yield data. Other valuable historical information, which can no longer be replicated, are the analyses of samples of groundwater that entered working mines from specified horizons, rather than present-day analyses of acid mine drainage. It is found that there is little deep regional groundwater flow across the basin, for example towards the sea, and most groundwater flow is of river catchment scale draining to the main rivers that traverse the coalfield. This analysis of the coalfield and the 3D model provide a foundation for future investigation into issues such as dewatering of new opencast pits, *in situ* gasification or anthracite mining.

The South Wales Coalfield is an exposed synclinal basin some 87 km long by 30 km wide with an overall area of some 2200 km². Coal production in South Wales peaked at the start of World War I, but declined steadily after the general strike of 1926 ([Brabham 2004](#)). Wholesale closure of the coal mines took place in the 1980s and early 1990s after the political decision to reduce dependence on the UK coal mining industry. The last working pit, Tower Colliery [SN 939 054], near Hirwaun ([Fig. 1](#)), was closed in January 2008, leaving only a few relatively shallow drift mines and opencast sites in operation. As with many of the South Wales collieries Tower was part of a large interconnected mine complex, with connections between shafts up to 10 miles apart being common. Mine water rebound is now well advanced over much of the coalfield and there are no deep mine dewatering schemes at present. Steady-state conditions have developed in some areas, where piezometric levels are now controlled by gravity discharges from the mines. Some of these require treatment; there are currently 11 mine water treatment schemes operating at abandoned flooded coal mines in South Wales. Morlais [SN 572 023] is of note as the high flow of iron-rich mine water required construction by the Coal Authority of the largest (at the time) constructed wetlands in Europe (see www.coal.gov.uk). Three key issues now face the region: the continued development of deeper opencast coal workings to access the remaining shallow coal reserves, *in situ* gasification and the development of deep mines to access the low-sulphur anthracite that remains present throughout much of the western part of the coalfield.