

Estuarine contamination

A present and potential environmental geohazard

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Many major estuaries in Great Britain (e.g. Forth, Tyne, Tees, Humber, Thames, Solent, Tamar, Severn, Mersey, Ribble and Clyde) are sites of urban, port, industrial and recreational development. They are also important for nature conservation, providing nationally and internationally significant habitats for birds and marine life. Unfortunately, man's activities frequently have a detrimental impact on nature and our estuaries provide abundant examples of past damage. They also are threatened by present and future environmental hazard.

Estuaries form the link between river systems and the sea and sediment from both land and sea sources can be deposited there. River waters and sediment carry contaminants from mining, industrial and agricultural activities in the hinterland, developments on the shores of the estuary input wastes directly, whilst tidal currents bring in water and sediment from offshore. These latter might, for instance, have moved along the coast from towns and industry, or have come from further out to sea carrying unwanted products of shipping or the hydrocarbon industry. At the present time, both organic and inorganic contaminants in sediments may be buried and in storage, undergoing remobilisation, or being deposited; their distribution may be influenced also by the activities of organisms such as shellfish and worms and gradual changes in chemistry may increase their uptake by marine animals. Much is

being done to reduce the release of contaminants into the environment from industrial, urban and agricultural waste, but there is a shortage of knowledge about the types, amounts and locations of contaminants stored in sediments.

The Mersey is a good example of a contaminated estuary, having suffered a legacy of abuse and neglect since the beginning of the Industrial Revolution. The discharge of effluents from manufacturing processes, together with wastewater from the burgeoning centres of population, resulted in the estuary gaining the unenviable reputation of being one of the most polluted in Europe. Whilst the long-awaited remedial actions, taken over the past two decades, have unequivocally reduced the concentrations of dangerous substances currently being deposited, in some instances to pre-industrial levels, vast quantities of potentially hazardous substances remain locked up in the sediments. However, we do not know enough about the distribution of the contaminated sediments to be able to predict the consequences of flood defence and drainage activities upstream, dredging, port and industrial development along the estuary shores, or operations and natural processes in the coastal zone, including sea-level rise due to global climatic change.

In recognition of the problems of contamination, the Marine Pollution Monitoring Management Group of Department of the Environment, Transport and the Regions decided that there should be regular sampling of a network of coastal and estuarine monitoring stations around the UK, which

should include some that are not expected to be significantly contaminated. Responsibility for the monitoring of biological, physical and chemical determinands at these stations lies with the Environment Agency; Scottish Environment Protection Agency; Centre for Environment, Fisheries and Aquaculture Sciences; Scottish Office Agriculture, Environment and Fisheries Department; or Department of Agriculture for Northern Ireland/ Department of the Environment, Northern Ireland; depending on the location of the stations.

This national programme produces a coordinated and reliable national data set on sediment contaminants in inshore and coastal waters, but it does not address the problem of the storage of contaminants in sediments and the prediction of the environmental impact of their movement due to man's activities or natural processes. To this end, the BGS is planning a survey programme which will attempt to map the distribution and thickness of contaminated sediment in major UK estuaries as an aid to coastal zone management.