

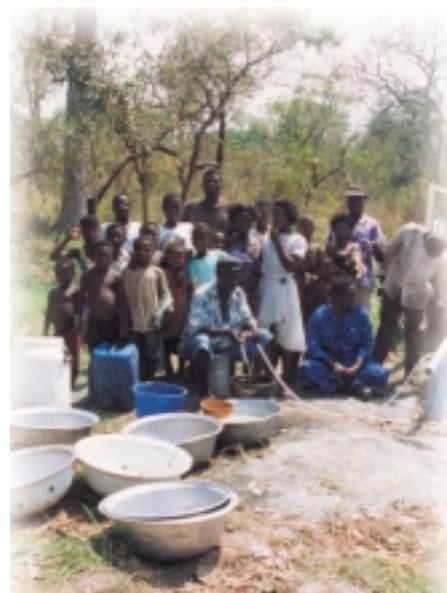
# Geology and life

## The role of BGS science

by Allan Rogers, FGS MP

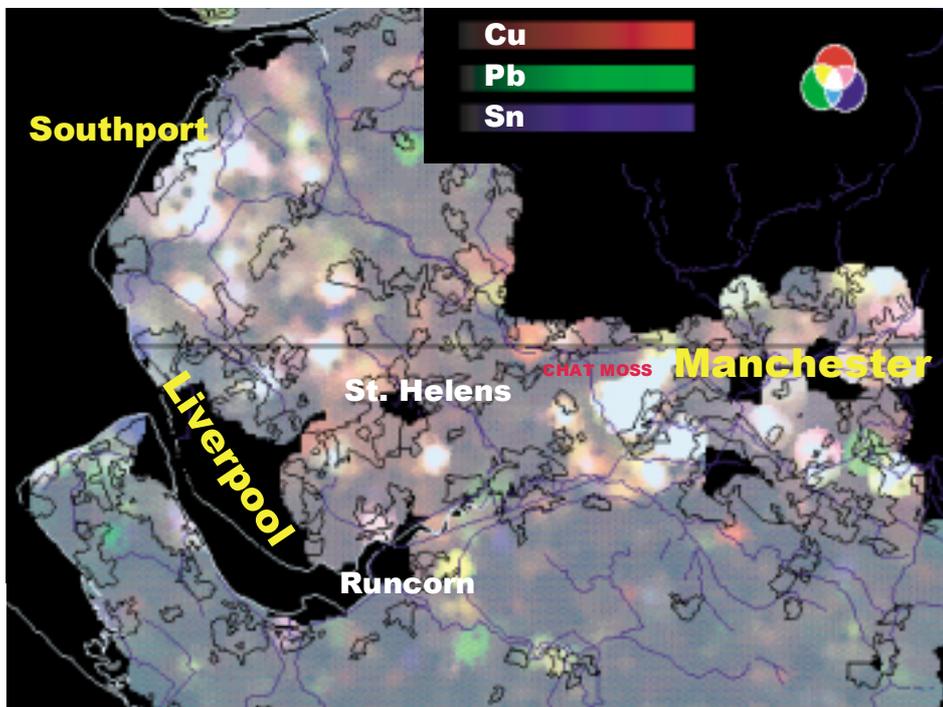
I am a geologist — a Member of Parliament — a father and grandfather. With many others, I care about the planet and desire to leave it a better place for future generations. That is why it is a pleasure to be able to introduce the work of BGS scientists who practise in countries all over the world, helping to improve their economies, environments, and the quality of life of their citizens. The ground beneath our feet is fundamental to our daily lives — in our homes, at work and leisure. It provides the water we drink and the food we eat.

The British Geological Survey has 780 staff. Fifty per cent of its annual £42m budget comes, via the NERC, from the government's science fund with the remainder coming from the sale or licence of applied geoscientific solutions. One of the BGS's tasks is to find out if there is any contamination, natural or man-made, which could affect people's health, directly or through the food chain. It is important to understand the science to cope with dangerous or potentially dangerous situations. We must know the state of the planet we live on today so we can measure changes tomorrow.



Jeffrey Davies, BGS © NERC

Members of the Afram Plains Development organisation undertaking a pumping test using a whale pump system at Bong Krom, Afram Plains, Ghana. Part of a DFID-funded project to understand groundwater occurrence and resource limitations within geologically difficult areas.



BGS © NERC

This map shows a three-component colour addition map for copper (Cu), lead (Pb) and tin (Sn) in which coincident high levels appear as white areas. High levels of these three metals rarely occur together naturally, and are therefore good indicators of industrial contamination. High levels of these and several other metals at Chat Moss and Carrington Moss near Irlam, and at Halsall Moss near Southport, show that industrial waste dumping was used as a means of reclaiming the former fenland for agriculture.

### Projects

It was Jonathan Swift who said '... whoever could make two ears of corn or two blades of grass to grow upon a spot where only one grew before would deserve better of mankind and do more essential service to his country than the whole race of politicians put together...'. As a politician myself I feel I have the right to agree.

In many countries, crops extract far more nutrients from the soil than are being replaced by fertilisers. The BGS has identified the quantity, quality and location of local phosphate deposits in Sub-Saharan Africa, and are establishing ways to make agricultural lime available cheaply and easily to farmers in Zambia.

### Contaminated Land

There are places where I would not allow my grandchildren to play. The history and heritage of such land must be fully understood and a record kept forever. No commercial firm would do this. But the BGS does, both at home and in 'technical co-operation projects' in industrialised countries such as Thailand, Mexico and Jordan.

Fifty million children are brain damaged because of deficiency of iodine. Millions of Bangladeshis depend on water that is naturally tainted with arsenic. BGS scientists are finding ways to alleviate this misery.

Half a million Tanzanians depend on gold mining for their income, but methods are crude and workers risk mercury poisoning. The element cerium has long been suspected to influence a fatal heart condition in children. The BGS has been comparing geological conditions in Uganda and India to find any causal links.

Subsurface methane causes death and destruction; radon causes lung cancer. The BGS are making maps and archiving information to help planners and builders avoid disaster.

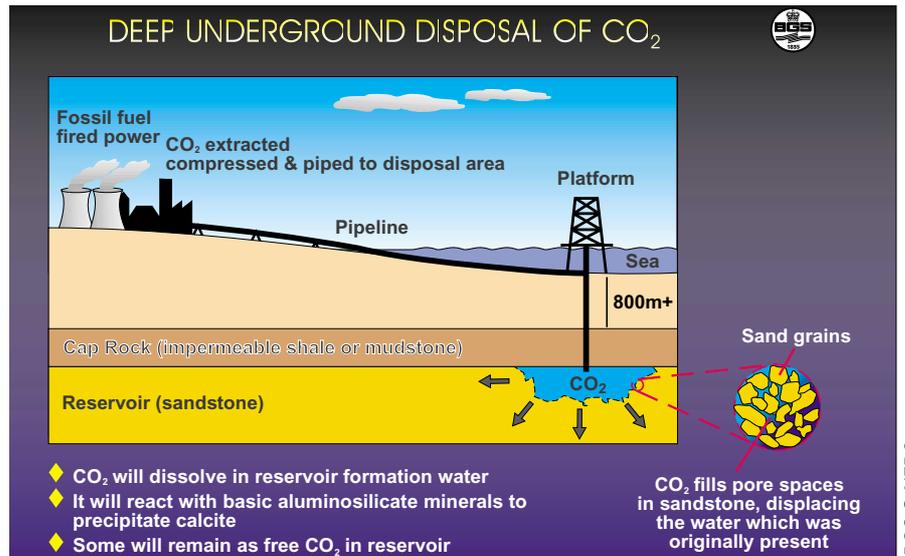
*“... the scientists’ duty is to evaluate, analyse and propose solutions. It is then the duty of politicians to act ...”*

One useful example is an unexpected finding from a BGS survey. High levels of heavy metal contamination have been found in some farming areas of drained fenland in rural Lancashire. BGS research indicates that industrial and urban waste, especially coal ash and foundry slag, was used as fill material in these former fens. This practice had not been documented and might not have been detected without the regional geochemical survey.

## Water

People die for the lack of clean water. Polluted water spreads diseases. One third of the world population suffers from water-borne illness. Nitrates, pesticides, and other agricultural chemicals have an impact on groundwater quality. The BGS uses field and laboratory studies combined with mathematical modelling to make sense of its complexities. But the balance is vital here, too.

Where sea meets shore is a unique environment of urban and commercial devel-



*Schematic diagram to illustrate the proposed method for the deep underground disposal of carbon dioxide.*

opment. Tourism and fishing, industry and recreation are all at risk if the delicate ecosystem is upset. In this zone, sediments from major rivers, often contaminated with agricultural and industrial effluent are mixed with marine sediments which may also have suffered contamination. The BGS has established a coastal pollution monitoring programme, the Land–Ocean Contamination Study (LOCS) and was involved in the investigation of a case of sea water intrusion in Mexico.

## Air

Climate change and air quality are critical issues.

Blackdamp, or ‘stythe’, is a lethal mixture of carbon dioxide and nitrogen produced in mine workings. There has already been one fatality and, unless planners and developers take blackdamp into account, there may be more.

The toxic plume from a London traffic jam can be traced right across Norfolk.

The BGS is investigating whether it will be possible to dispose of carbon dioxide from the UK’s industrial sources in the rocks underlying the North Sea. There will be a price, but the science is there. The decision whether or not to proceed is for politicians, not scientists to make. And that brings us full circle. Back to the balance of reality.

The above examples of projects undertaken are not to be viewed in isolation — land, air and water interact and impinge on each other and relate to other aspects of life, especially whether the resources and political will exist to resolve the problems. The scientists’ duty, however, is to evaluate, analyse and propose solutions. It is then the duty of politicians to act.



*Sampling sediment on the Dungeon Banks, Mersey Estuary, to determine the input of contaminants entering the Irish Sea.*