

# Groundwater and sustainability

## Worldwide problems and some geological solutions

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**S**ustainability has very different meanings for the villager in sub-Saharan Africa, the farmer in Bangladesh and the commuter from North Kent. The consistent supply of clean and wholesome drinking water is probably not an issue to the family living on the banks of a Chalk stream, but the lack of plentiful water for life and better health is a major problem in the day to day routine of a family in Oju, Nigeria. This family may have little concern for the degradation of

the quantity and quality of the hydrological environment, but will wish to sustain a reasonable standard of living and avoid becoming ill. Deluged with an excess of water in the monsoon, the Bangladeshi citizen is now also plagued with fear she or he may be being poisoned by the very same 'safe' groundwater supplies that were once promised as the route to healthier, more sustainable way of life.

Groundwater, undoubtedly, provides the cheapest and safest water supplies throughout the world, but its, hitherto, excellent reputation has become tarnished. A number of factors have all combined to knock groundwater from its pedestal as a panacea for all problems.

These factors include dry stream beds in southern Britain, the discovery of major pollution beneath cities throughout the world, toxic levels of naturally occurring arsenic in Bangladesh and China, unreliability due to demand pressure and poor maintenance and climatic change or variability as seen in severe droughts in Africa. Over 1.3 billion people do not have access to safe water and the Earth's biodiversity is diminished by pollution and water scarcity.

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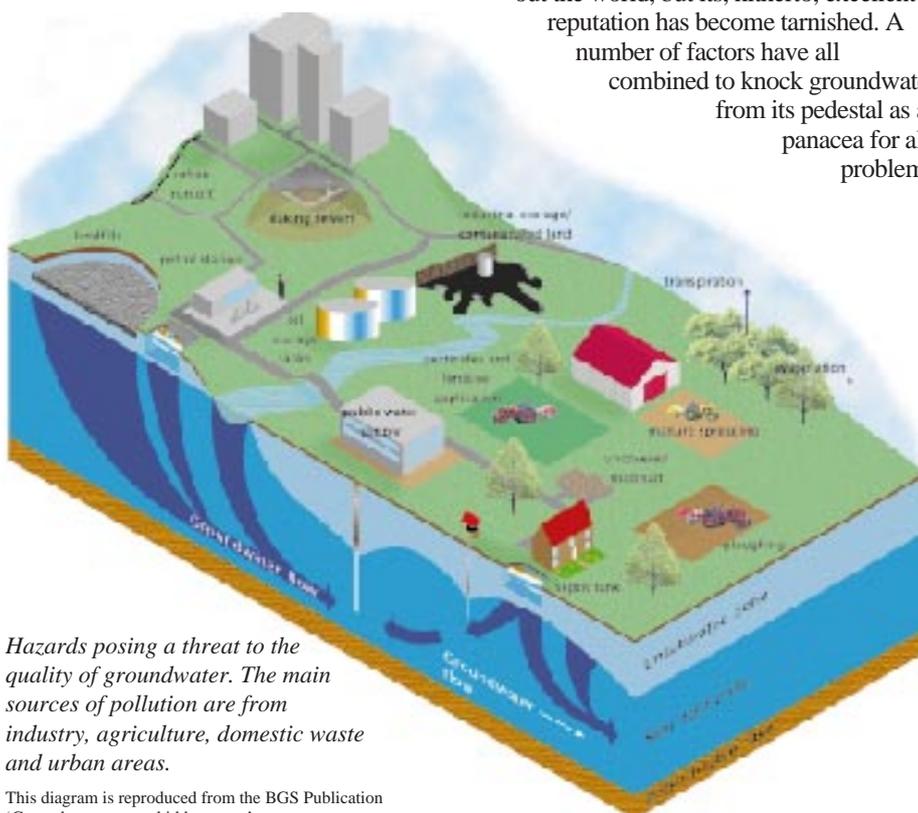
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This has been recognised by the 'Key Principles for Sustainable Integrated Water Management', as set out in Agenda 21 and reiterated at the Special Session of the UN General Assembly in June 1997. In November 1997, the British Government published its White Paper 'Eliminating World Poverty' which heralded a new focus for Britain in the developing world. In it the government set out its policy to achieve 'sustainable development of this planet'.

Towards the end of the recent British Presidency of the European Union, political agreement was reached on the draft Council Directive establishing a framework for Community action in the field of water policy. The policy is intended to promote sustainable water use and management. The overriding similarities between these various initiatives is the emphasis on management, or rather on integrated management, of the environment, including water use for human development.

The scale of the problems that beset the population of the Earth are difficult to imagine. We, hydrogeologists, have little perception of the scale of water scarcity and pollution on a worldwide basis. Even at home where we pride ourselves on the amount of knowledge we possess, we know little about the sustainability of a wetland ecosystem and we have insufficient knowledge of the processes that control the quality, quantity and flow of groundwater.



*Hazards posing a threat to the quality of groundwater. The main sources of pollution are from industry, agriculture, domestic waste and urban areas.*

This diagram is reproduced from the BGS Publication 'Groundwater — our hidden asset.'



*The exploitation of groundwater combined with drought conditions can produce environmentally unacceptable results such as the dry bed of the River Darent in 1996.*

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The challenge for the new millennium is gargantuan, but work has begun. The BGS is deeply involved in the solution to these issues across four continents:

- understanding the arsenic problem in Bangladeshi groundwater;
- development of management tools for the control of groundwater degradation beneath cities;
- working at community level to provide sustainable and safe drinking water supplies from non-aquifer rocks in Nigeria;
- developing techniques for coping with droughts in Africa;
- developing groundwater protection policy in differing environments;
- providing guidelines for protecting small sources in upland Britain;
- studying new groundwater engineering solutions to supply ever increasing demand in the UK;
- and providing approaches to living with the water environment so that the next generation will have one to enjoy.

These are just some of the activities, with which BGS is involved, that support the goal of sustainability of groundwater. Groundwater is the largest and most important source of drinking water. We have no choice but to understand it more and manage it better.



*Women and children often walk long distances to collect scarce drinking water in Africa.*