Expert view: Water

Unlocking potential

A US$20 million groundwater research programme aims to bring benefits to Africa's poorest people

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Today, 747 million people do not have access to safe drinking water and 590 million of these people live in sub-Saharan Africa, according to the latest figures from the World Health Organization and UNICEF's joint monitoring programme for water supply and sanitation

Is there really such a shortage of water in Africa that for every 20 people there are seven that cannot access safe water? Definitely not. Where there is a shortage is in robust evidence and understanding of aquifers and groundwater across the continent.

Unlocking the potential of this resource beneath our feet could be the most effective way for everyone to access water – something that, since 2010, is a human right and therefore a duty of every government.

So what groundwater resources does sub-Saharan Africa have? According to a 2012 study by the British Geological Survey (BGS), the availability of groundwater is much greater than previously thought.

Useful though this research was, it raised more questions than it answered: how can the groundwater be used cost-effectively and sustainably? Is the quality and yield good enough to meet people's needs? Is there competition between different uses? Can African countries use and manage groundwater to meet their needs without increasing their dependence on international aid? Are there sensitive rivers and ecosystems that also rely on that resource?

This has led a coalition of UK funders – the Department for International Development (DFID), the Natural Environmental Research Council (NERC) and the Economic and Social Research Council (ESRC) – to invest in a seven-year, £12 million (US$20 million) research programme called UPGro (Unlocking the Potential of Groundwater for the Poor), which began in 2013.

In the first round there are 15 'catalyst' research projects lasting one year, led by research teams from across Africa and Europe. They are exploring a broad range of topics relating groundwater to tackling poverty.

How much groundwater?

Five of the projects focus on our relative ignorance of the magnitude of groundwater resources in Africa, and the corresponding difficulties of managing groundwater well. They propose various ways of better estimating groundwater recharge, and linking this improved knowledge to better management or 'governance'.

In Ethiopia, Ghana and South Africa, researchers are working to improve community-level groundwater monitoring and governance so that management of groundwater for irrigation use can adapt to overcome stress caused by drought and other challenges.

In Malawi and Zimbabwe, a better understanding of the hydrogeology of the Basement Complex strata is being linked to solving problems around well-point failure, health and poverty.

Just because groundwater is readily available does not automatically mean that the poor will benefit. In Kenya, one study is looking at the complex reality of supplying a rural community in an area where there are high demands for water from sugar cane plantation irrigation, tourism and – what will soon become – Kenya's largest mine.

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As well as establishing a better understanding of the aquifer, the work will also look at ways of improving its governance so that the resource can be shared equitably.

Groundwater quality

Another four projects focus on groundwater quality, especially in relation to its potability. Threats come from both natural and man-made sources: in Ethiopia, work has been underway to map natural levels of fluoride in groundwater and how it varies spatially and over time.

Fluoride, while healthy in small amounts, causes mottling of teeth and deformed bone growth in the high doses often found in the Rift Valley groundwater, which finds its way into the food chain through direct drinking and in food.

Meanwhile, in Zambia, Kenya, Tanzania and Nigeria the work is focusing on monitoring and mapping groundwater pollution in and around urban areas and how to protect groundwater supplies.

Developing groundwater

Four projects are focused particularly on developing groundwater for human and agricultural use, and the challenges associated with continued sustained delivery of water services.

Across Africa, an estimated one in three hand pumps are not working at any one time, although the real number could be much higher. This is not just a scandalous waste of money, but also a trail of broken promises. In Uganda, the reasons why are being explored and tested in much greater detail than had been done previously so that future projects can avoid the mistakes of the past.

There are also new opportunities too: roads can make a real impact on local hydrology and often suffer from flooding – or create flooding by acting like a dam. Work in Ethiopia is looking at how to turn this problem into a solution by using roads to increase groundwater recharge at little or no extra cost.

New technology is also opening up opportunities. Manual drilling is an extremely cost-effective way of tapping into groundwater, but it is only possible in certain geological conditions. Researchers in Senegal and Guinea are therefore looking at how remote sensing can be used to map favourable areas and how to get that information to the drilling entrepreneurs who can make use of it.

Risk, uncertainty and change

Although most of the projects allude directly or indirectly to the risks and uncertainties surrounding the management of groundwater, two focus on this aspect strongly, and another two focus on variability and change in climate and land use, and their impact on groundwater.

In West Africa, efforts are focusing on the Upper Volta Basin in Burkina Faso and Ghana to look at how recent climate change and land use change scenarios are likely to change the availability of groundwater.

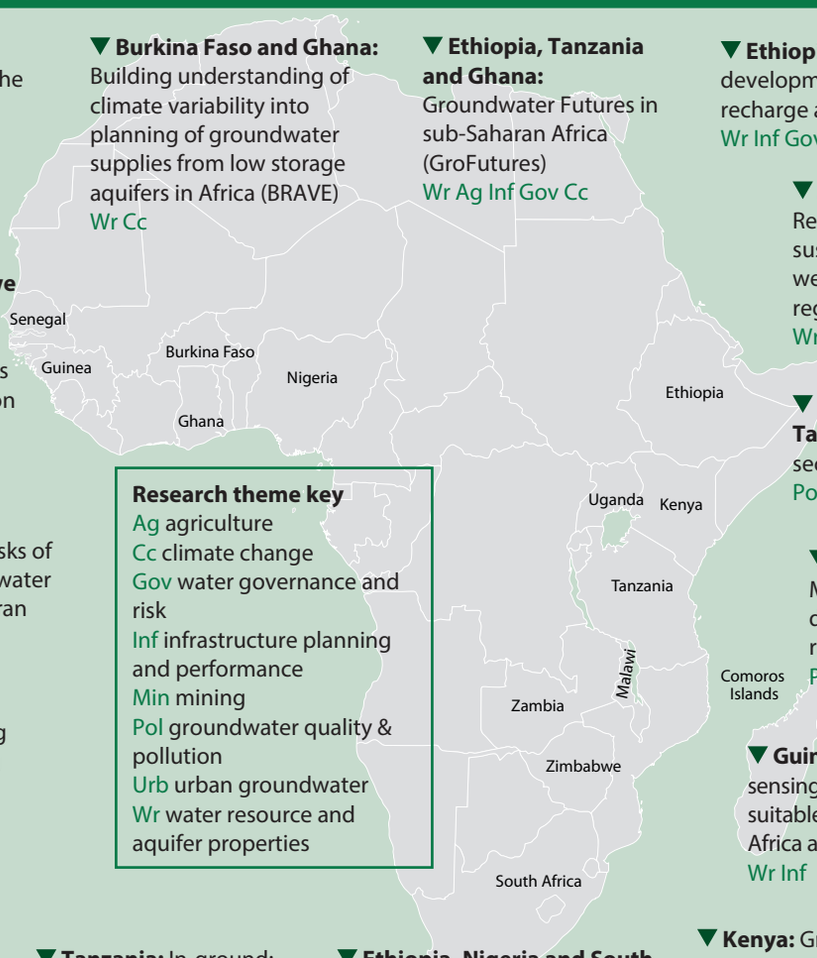
Coastal aquifers are also at risk from rapid population growth, increasing abstraction and the effects of climate change on sea level and rainfall.

To understand the physical and socio-economic threats more clearly, one team is bringing together researchers from Kenya, Tanzania and the Comoros islands, located off the southeast coast of Africa.

The Catalyst Projects are working in a range of contexts. Unsurprisingly, given the population distribution in sub-Saharan Africa, most of the projects are working in predominantly rural environments.

The projects range from seasonally humid to dryland contexts. Three of the projects are working in urban or peri-urban environments, while two are focused specifically on coastal regions. What links all of these is that

Catalyst Projects 2013-2014



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they are inter-disciplinary – bringing together the academic rigour of natural and social sciences with the pragmatic wisdom of practitioners.

The link between research and policy and practice is critical. For this reason, UPGro has joined forces with the Rural Water Supply Network (RWSN), a global network with more than 5,000 members in more than 130 countries, whose core activity is to promote the professionalisation of the water-well drilling sector and the development of water services that last and that reach everyone.

Through partners such as UNICEF, the World Bank, the African Development Bank and the Swiss Agency for Development Cooperation (SDC), as well as non-governmental organisations and the private sector, there is the opportunity to improve the way groundwater is used and managed across Africa.

However, the challenges are many and the process of change will take time and considerable effort. In fragile states, such as Liberia and Sierra Leone, there is a paucity of records and almost no historic data of groundwater behaviour. Earlier this year, Swiss independent resource centre and consultancy the Skat Foundation and the RWSN's water and sanitation programme supported the Liberian government to compile its first sector performance report on water, sanitation, hygiene, water resources and waste management.

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It is processes like these that help focus government activities and capture political attention of key issues.

For example, there is anecdotal evidence of the adverse impact that artisanal mining is having on surface and groundwater quality, but hard evidence is lacking, governance tools do not exist and political action is hard to mobilise.

Across much of sub-Saharan Africa there are similar stories and a large part of the answer comes from establishing basic, rigorous monitoring and research that can inform decision-making. By building strong partnerships between government, academia and the private sector, the potential of groundwater can be unlocked for the benefit of everyone.

Sean Furey is a water & sanitation specialist at the Swiss-based Skat Foundation, Switzerland, which hosts the secretariat for the Rural Water Supply Network (RWSN) and is acting as a knowledge broker for the UPGro programme. For more information on UPGro or RWSN visit: upgro.org and www.rural-water-supply.org