WORLD WATER DAY 2015

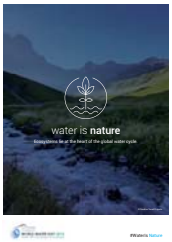
Embracing Groundwater...

Introduction Humanity needs water, and water is at the core of sustainable development. Water resources and the services they provide underpin poverty reduction, economic growth and environmental sustainability. From food and energy security to human and environmental health, water contributes to improvements in social well-being and inclusive growth, affecting the livelihoods of billions. The majority of the world's freshwater resources lie beneath the ground, so let's see where groundwater features in each of the seven major themes picked out for this year's World Water Day.

Health Despite impressive gains towards the Millennium Development Goals, 748 million people still do not have access to an improved source of drinking water and 2.5 billion do not use an improved sanitation facility.

About half of the 748 million live in Sub-Saharan Africa in countries in which groundwater is the best or only option for much of this unserved population, especially in the rural areas. Protected wells and boreholes drawing groundwater from aquifers can usually provide water of greater reliability and better quality than traditional sources, greatly contributing to human health. However, the expertise of the hydrogeological profession is needed to provide sound designs, locate productive sites and supervise construction to help ensure the massive investment required is well spent. Moreover, plans for substantial expansions of sanitation coverage must take into account the need to protect the quality of groundwater resources in the underlying aquifers.

Ecosystems Ecosystems such as forests, wetlands and grassland lie at the heart of the global water cycle and freshwater resources including groundwater depend on the



continued healthy functioning of these ecosystems. However, many economic models do not value the essential services provided by freshwater ecosystems. For groundwater, pollution arising from agricultural, urban and industrial activities can damage ecosystems and impair the quality of the water which replenishes aquifers. Further along the water cycle, this pollution in turn damages wetland ecosystems dependent for their functioning on discharging groundwater. Excessive abstraction of groundwater for irrigation or urban supply produces declining groundwater levels and reduces the discharges needed to sustain ecosystems and the services they provide.

Urbanization Today, half of the people on the planet live in a city. Every week one million people move into cities and most of this rapid urbanization occurs in developing countries. This produces demands on the water supply and wastewater infrastructure which cities find hard to meet. Where they depend

[...Urbanization]

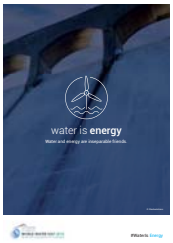
on groundwater, cities often search further and further into their surroundings for suitable aquifers to exploit to meet this growing demand, often at the expense of the existing rural communities. Inadequate and unreliable municipal water supply leads residents to construct their own wells and boreholes for self-supply. The very dense urban populations produce enormous pollution loads which have often rendered the underlying aquifers unusable for drinking water supply, accelerating the search for more distant sources. Antiquated and poorly maintained water supply systems lose too much of the water they deliver and sewerage systems struggle to keep up with urban expansion. It is often the fast-growing medium-sized cities and towns which most lack the political, financial and technical capacity to keep up with demand.

Industry

Global water demand for manufacturing is expected to increase faster than other sectors, and dominantly in emerging economies and developing countries. Some large corporations are beginning to evaluate and reduce their water use and that of their supply chains. Small and medium-sized enterprises (SMEs) face similar water challenges but often without the financial and technical capacity to address them. Industry both uses groundwater, often very intensively and locally, and contributes to pollution of aquifers by disposal of its wastes and by-products. Improvements in process efficiency and treatment technology are reducing the quantity of groundwater used and lessening the potential for contamination.

However, because of the relatively slow movement of groundwater compared to surface water, once polluted, aquifers can take many years to recover and in the meantime human and environmental health can be severely compromised.

Energy



Water and energy are natural partners; water is required to generate energy and energy is required to deliver water. Large amounts of energy derived from diesel and electric pumps are used to pump groundwater for irrigation and the pricing and subsidy structure can have a major impact on encouraging or discouraging farmers from using this precious water efficiently. Using brackish groundwater instead of seawater to produce freshwater by desalination is also very energy-intensive. Renewable energy comes from resources which are naturally replenished such as sunlight, wind, tides, waves and geothermal heat. These energy sources do not require large quantities of fresh water. However, the cultivation of fuel crops for power generation requires large amounts of land and water, and may divert these resources away from food production.

Food

Agriculture is the single largest user of water globally. One litre of irrigation water produces one calorie of food; inefficient water use much less. The global figures for water use in agriculture are reflected for groundwater too; in many countries most withdrawals are for irrigated crops. The result is declining groundwater levels, depleting aquifers and causing land subsidence and severe impacts on connected surfaces waters and their associated ecosystems. More food is needed, but predicted

[...Food]

growth rates for agricultural water demands are not sustainable; farmers need to use water more efficiently, increase crop productivity and turn to less water-intensive crops. With increasingly intensive agriculture, groundwater pollution from fertilisers and pesticides has become more severe and widespread. Experience shows that a combination of incentives, including more stringent regulation, enforcement and well-targeted subsidies, can help reduce agricultural pollution of groundwater.

Equality

Every day women and children in some developing countries spend on average a quarter of their day collecting water for their families to use. This is time that could be spent much more productively, and investments in improved water supplies show substantial economic gains. Groundwater can be very attractive as a source of improved domestic water supplies as it can often be found close to the communities where it is needed, may be relatively cheap to develop and generally has excellent natural quality and protection from pollution provided by the soil and unsaturated zone of the aquifer. Careful development of groundwater supplies can therefore greatly cut down collection times, and many of the countries with the most still to do to reach water supply targets are likely to be dependent on groundwater. The groundwater stored in aquifers also has a vital role to play as a buffer in times of both droughts and floods, especially if, as predicted, extreme events become more frequent as a consequence of climate change.

Closing comments

The global water community is working hard to establish new Sustainable Development Goals to come into effect later in the year. We can see even from this brief summary what a vital role groundwater can play in helping to support these Goals, provided it is developed wisely and managed and protected with great care. We look forward to working towards these goals with our partners at the country level through IAH's 40 national chapters and at the international level with our partners in UNWater.

Find out more

Full information regarding World Water Day can be found on the relevant UN Water website; go to http://www.unwater.org/worldwaterday/home/en/. UN Water's main website is http://www.unwater.org/home/en/. Information regarding the International Association of Hydrogeologists (IAH/AIH) can be found overleaf and on our website http://www.org.

Acknowledgements

World Water Day logos and graphics are used courtesy of UN Water (http://www.unwater.org/worldwaterday/home/en/).

INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS (IAH/AIH)

About Us

The International Association of Hydrogeologists (IAH/AIH) is a scientific and educational charitable organisation for scientists, engineers, water managers and other professionals working in the fields of groundwater resource planning, management and protection. Founded in 1956, it has grown to a world-wide membership of more than 4000 individuals.

Mission and Aims

Our mission is to further the understanding, wise use and protection of groundwater resources throughout the world. IAH aims to be a leading international society for the science and practice of hydrogeology and to be a globally recognised information source and facilitator for the transfer of groundwater knowledge. We endeavour to raise awareness of groundwater issues and work with national and international agencies to promote the use of groundwater to ensure ready access to safe drinking water. IAH also promotes the protection of aquifers against pollution, the improvement of aquifer storage and the management of groundwater resources to assure the sustainability of groundwater-dependent ecosystems.

A World-wide Groundwater Association

IAH is truly a world-wide association, its efforts being made through its many National Chapters (groups), Scientific/Topic based Commissions and Networks; its international team of Council members, and its UK based Secretariat. In addition we have over 4000 members based all around the world. We are striving to increase this number and our world-wide activities because the greater our number and effort, the more powerful and effective our voice internationally and the wider we can reach in all aspects of our work.

Find Out More

Visit our website http://www.iah.org, email info@iah.org.