The solar pump revolution could bring water to millions of Africans but it must be sustainable and fair

Alan MacDonald

Solar power could enable 400 million Africans without water to tap into groundwater aquifers. However, we must ensure smaller projects do not lose out in the rush for new technology

It's a truly dreadful irony: for many of the 400 million people in sub-Saharan Africa who lack access to even a basic water supply, there is likely to be a significant reserve in aquifers sitting just a few metres below their feet.

Groundwater – the water stored in small spaces and fractures in rocks – makes up nearly 99% of all of the unfrozen fresh water on the planet. Across the African continent, the volume of water stored underground is estimated to be 20 times the amount held in lakes and reservoirs.

The opportunity that groundwater presents for increasing access to water is widely recognised, with more than half of the global population already believed to be relying on it for drinking water.

When you add the ability of solar energy to power the necessary infrastructure and the fact that groundwater supplies are much more resilient than surface water during drought, the potential for harnessing this water source to provide a clean and regular supply to communities in chronic need comes into focus.

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The opportunity presented by solar technology for increasing groundwater pumping for drinking and irrigation will be discussed this week at the International Association of Hydrogeologists' (IAH) World Groundwater Congress in Davos, Switzerland.

Much of the debate centres on how to best deploy this increasingly affordable solar technology to unlock groundwater potential; not just in terms of drinking water, but also in terms of irrigating crops – unleashing the ability to address both water and food insecurity without the need for fossil fuels.

The IAH congress comes at a time when the ability to map groundwater availability across the continent has never been greater. New understanding of African geology is helping local hydrogeologists predict which areas have the most potential for solar pumps and new, easy-to-use technology is being developed to help better assess the quality of groundwater.

Communities are helping determine the most sustainable management models for water supply, while donors and governments are taking increasing interest in the quality of rural supply chains.

Momentum is building, and with it comes the chance to deliver meaningful, lifesaving change.

The fly in the ointment, however, is the complexity that comes from moving the hypothetical into the real world. There are two issues that will need to be at the centre of the discussions in Davos if we are to secure a sustainable route forward.

First is the potential for overuse. With the ability to pump large volumes of water comes the possibility of overexploiting and depleting groundwater resources. This is a significant point of concern across parts of Asia, the Middle East and the US.

Second, we must not lose sight of the geological and environmental limitations of the technology to benefit fully from this opportunity. The ability to reach all parts of the region does not yet exist: about 30% of Africa's rural population live on ancient rocks that may not be able to support the higher pumping rates demanded by large solar pumps.

A recent study by the organisation I work for, the British Geological Survey, alongside partners from Paris-Saclay University, showed that geology was the key limiting factor to solar pumping, not the availability of sunshine.

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I will be calling for caution among those who see this solar-pumping revolution as a panacea – those who are focusing solely on the installation of large-scale systems that extract large volumes of groundwater that can then be piped directly to homes or to the farmers that need it.

Such programmes can provide a balance between investment and impact, and as such they are attracting increasing interest and financial backing. So they should, as when they work they will change the lives of many millions of people.

However, alongside the big projects, there should continue to be investment in small-scale use of groundwater for rural water supply, and for technologies such as handpumps or low-yielding solar-powered pumps that are more appropriate for the geology.

These smaller pumps could improve access to water for rural communities while providing additional safeguards against overuse by matching pumping rates to the geology.

Where the geology is complex and yields from wells are low, small solar systems can pump throughout the day and store the water for domestic or productive use when it is actually needed.

We should measure our success in combining the power of solar technology with groundwater not in terms of people helped, but in those left behind. This approach would help focus our minds on a comprehensive solution – securing sustainable solutions that enhance access to clean drinking water for all.

Technological breakthroughs are exciting and progress is exhilarating. But it is essential that a focus on solar pumps does not distract attention from the most marginalised and vulnerable communities.

I would invite everyone to see this "solar groundwater pumping revolution" in terms of equity. Through that lens, we have the chance to ensure that this precious resource is sustainably and fairly unlocked to all those who are still waiting for a safe and reliable water supply.

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