News

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Darfur lake is a 'mirage'

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Abstract

Geologists dismiss claims for ancient water source.

"Water find may end Darfur war," proclaimed headlines last week, describing a claim by researchers at Boston University in Massachusetts to have identified the site of an ancient lake in northern Darfur that could imply extensive groundwater reserves. But geologists speaking to *Nature* dismissed the hype, pointing out that the lake dried up thousands of years ago and that it will not necessarily be surrounded by aquifers holding ancient water. Furthermore, they say that the lake was identified in the 1800s, and that its size and shape were detailed over a decade ago.

The press release from Boston University — entitled 'Mapping of ancient mega-lake by Boston University scientists catalyst for global humanitarian outreach' — announced a '1,000 Wells for Darfur' initiative to drill around the lake "to create new groundwater resources to help establish peace and economic security in the region."

The initiative was launched by the government of Sudan after a meeting between President Omar al-Bashir and geologist Farouk El-Baz, director of the Boston University Center for Remote Sensing. El-Baz had announced the discovery of the 30,750 square kilometre lake — which would have contained around 2,500 cubic kilometres of water — in April, after scouring Landsat satellite images and sand-penetrating radar data from the Shuttle Radar Topography Mission.

The media's portrayal of a lake that actually contains water now stems from the way the Boston group presented its claims, says Mohamed Abubuker, an official at the Ministry of Irrigation and Water Resources in Khartoum. "The general public in Sudan, and even some very high-ranking officials, came to believe that what has been discovered is literally a lake — perhaps even with fish in it," he says. "The way El-Baz presented his efforts helped consolidate this misconception. It was like a political rally for a presidency run-up rather than a scientific portrayal of facts."

El-Baz contests this allegation. "It is incomprehensible for anyone to think it is a physical lake," he says, adding that he consistently made it clear that his argument was that the lake's water would have seeped through the sandstone substrate to accumulate as groundwater, and that drilling the sandstone under and around the ancient lake could yield fresh water.

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The Sahara region is known to have been rainy in past millennia, and this ancient water exists as groundwater in the so-called Nubian sandstone aquifer that stretches across Chad, Libya, Egypt and Sudan. The International Atomic Energy Agency, based in Geneva, has a programme to manage this aquifer.

Geologists argue that the rocks beneath and around the ancient lake are no more likely to hold water than those elsewhere in the Nubian aquifer. "Nearly everywhere it is present in Egypt the Nubian sandstone is water-bearing, so it is a matter of simple common sense that it would be the first place to look for significant groundwater reserves in Sudan," says Neil Sturchio, a geologist at the University of Illinois in Chicago, who describes the lake story as "hype".

There may actually be less chance of finding substantial water in the lake vicinity in northern Darfur than elsewhere on the aquifer. Although the porous, water-retaining sandstone aquifer is up to 3,500 metres thick at its northern fringes in Egypt, it thins to just a few hundred metres in northern Darfur, its southernmost reach.

Alain Gachet, a French geologist who has spent decades exploring for oil and water in the region, says that the configuration of rocks in the vicinity of the lake makes substantial water reserves even more unlikely. The lake is in an uplifted area, which has accelerated the erosion of the Nubian sandstones underneath, he says, and he claims that the lake is probably underlain by a crust of granite and other impermeable rocks rather than sandstone.

A. DE MONTESQUIOU/AP

Sheikas (traditional women leaders) at the south Darfur camp are in urgent need of water.

"There is obviously no trace of water at the bottom of this lake. In the best case, it would be so salty that it would be undrinkable," says Gachet, who uses radar remote-sensing techniques to detect aquifers close to the surface and is working with UN agencies to map potential wells across Darfur.

El-Baz admits there is a real possibility that there may be little sandstone in contact with the lake, but argues that this can be established only by drilling and geophysical surveys. "Gachet is right to say the lake has dried up, but not if he says that some of its water would not be held beneath the desert surface," he says, "No one can paint the subsurface picture with the available information."

Mike Edwards, of the Centre for Water Research at the University of Oxford, UK, says that it is misleading to suggest that groundwater will be found if the area of a former palaeolake is drilled. He adds that "there is no substitute for drilling as far as groundwater resources are concerned — but there will already be quite a few wells in this area. El-Baz's work is certainly not innovative."

Even if extensive water resources were to be found in northern Darfur, this would do little to alleviate the situation in western and southern Darfur, where current needs are greatest, say geologists. The geology of these areas is mainly impermeable rock, with only a few outcrops of sandstone aquifer.

If the Darfur aquifer did yield water it would only be a stop-gap solution as the aquifer is not being replenished by rainfall and the fossil water reserves are finite, says Johanna Kieniewicz, an expert on the Nubian aquifer at Denison University in Granville, Ohio. "It's essentially 'mining' groundwater," she says, adding that many of the oases in Egypt feeding off the Nubian aquifer have only around 50 years of water supply left.

The widespread notion that water is at the origin of the Darfur genocide, and so could be a solution, is also simplistic say experts. That idea has been perpetuated by Ban Ki-moon, secretary-general of the United Nations, who recently painted the genocide as a tragic result of resource scarcity.

But experts on the region argue that the true culprit is the National Islamic Front, which came to power in Khartoum in 1989 and has since expanded its political base though ethnic cleansing (see **Nature 447, 1038; doi:10.1038/4471038b 2007**).

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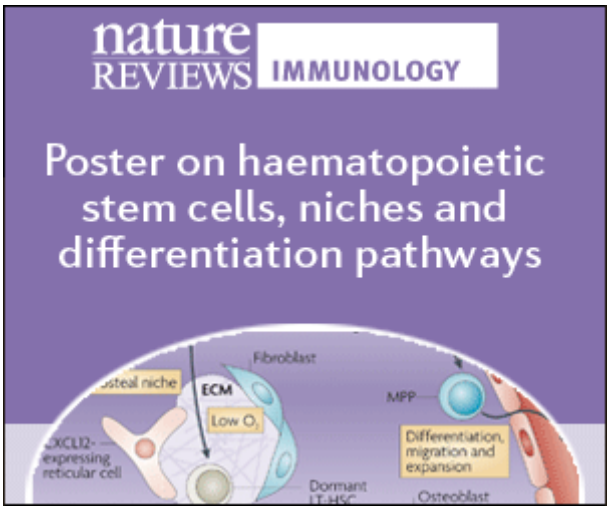

Al-Bashir is himself allied to the National Islamic Front. El-Baz defends obtaining support from such sources, and says his own efforts are apolitical. "This is science in the service of a humanitarian cause."

And even the novelty of the mega-lake 'discovery', which is to be published in the *International Journal of Remote Sensing*, has been questioned. Geologists claims that the palaeolake was identified by German scientists in 1985 and mapped during the 1990s. El-Baz admitted to *Nature* that the ancient lake deposits he claimed to have found had already been discovered, but says that new satellite data allowed his group to map its full extent.

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