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Irrawaddy may be poisoned by arsenic

Drinking water in Myanmar's Irrawaddy delta may be contaminated with high levels of arsenic, a geological map suggests.

Arsenic contamination is a serious problem in several regions of south Asia, most notably Bangladesh, where half of the country's wells may be polluted. Long-term exposure to arsenic can cause skin lesions and cancer.

A new map of southeast Asia by geologist Michael Berg, of the Swiss Federal Institute of Aquatic Science and Technology in Dübendorf, and his colleagues shows the probability of arsenic contamination in the groundwater, based on geological and soil properties (L. Winkel *et al.* *Nature Geosci.* doi:10.1038/ngeo254; 2008). The region is particularly prone to arsenic contamination, Berg says, because of the abundance of large deltas filled with relatively young sediment deposited just 10,000 years ago. Young sediment is more reactive, and so thought more prone to releasing arsenic.

The map marks several recognized arsenic hotspots, including the Red River and Mekong deltas and the Chao Phraya basin. And it reveals a high probability of arsenic in excess of safe limits in southern Sumatra and the Irrawaddy delta — regions for which few data previously existed.

The models will spur debate because not everyone agrees that soil characteristics accurately reflect the sediment below. Years of weathering could have taken its toll on surface properties, argues John McArthur, a geochemist at University College London. "It's like asking you to tell me what's in the basement of your building by looking at the floor plan

Skin lesions from arsenic poisoning.

of your lobby," he says. But Charles Harvey of the Massachusetts Institute of Technology in Cambridge notes that the sediment's youthful age means the surface may still hold useful information about the composition below. Berg and his collaborators found that their predictions matched known data 60–75% of the time.

Geologists agree that it would not be surprising to find arsenic in the Irrawaddy delta. A 2002 survey of 25 villages in the region found high levels of arsenic in 67% of the wells examined. That survey covered only a fraction of the 3.5 million inhabitants of the region, Berg notes: "There is an urgent need to have a closer look there."

Because the arsenic originates in sediment below the surface, Cyclone Nargis, which hit

the area in May, is unlikely to have greatly affected the region's groundwater. The inhabitants of the delta now mainly rely on rainwater as a source of drinking water, says Paul Jawor, a relief worker for Médecins sans Frontières who has recently returned from the region. The wells in the delta are currently mostly used for cleaning and washing, he says.

Heidi Ledford

Starting small but adding up: a free maths archive

A small group of researchers is meeting in Birmingham, UK, later this month to plan a free digital library of mathematics.

All the mathematical literature ever published runs to more than 50 million pages, with around 75,000 articles added each year. Over the past decade there have been several attempts to make this prodigious body of work accessible in a single digital archive, but so far none has succeeded.

A group of mathematicians

intends to change this. They have started small, with a handful of digitization projects in Poland, Russia, Serbia and the Czech Republic. In a few years they hope to unite these repositories with their western European counterparts in an archive to be hosted by the European Union, according to the organizer, Petr Sojka, an informatics scientist at Masaryk University in Brno in the Czech Republic. Eventually this pan-European archive could be expanded globally, he says.

To make such an archive easier to search, researchers have found ways to guess the subject of a paper on the basis of the frequency of symbols in it. But there will be many more-practical challenges, such as finding the funds to scan millions of old papers and striking deals with publishers who hold rights to them.

It may already be too late to build a single free mathematical archive, according to John Ewing, head of the American Mathematical Society, which maintains a list of more than

1,500 journals whose archives have already been digitized. "A few years ago, this model had the potential to change the mathematics journal literature in profound ways," he says. But most publishers have rushed to scan their own archives in order to lock them up and sell them to libraries.

"While the effort to digitize the smaller collections is admirable, and it's certainly worthwhile, it's unlikely to effect a larger change," says Ewing.

Jascha Hoffman