The Lake Nyos Gas Burst

In August 1986 at Lake Nyos, in Cameroon, West Africa, a volcanic crater lake released a large volume of CO_2. This was not a volcanic eruption, but a gas burst.

Being denser than air, the CO_2 failed to disperse and flowed down into nearby populated valleys resulting in the deaths of about 1700 people.

What happened at Lake Nyos?

Cameroon is situated on the Cameroon Volcanic Line, an area of volcanic activity that makes it susceptible to the release of volcanic CO_2.

After degassing from the hot magma, the CO_2 gas is trapped underground or escapes to the surface. In the case of Lake Nyos, the CO_2 slowly moved into natural pathways feeding into the lake and directly into the lake. CO_2 is soluble in water and so dissolved into Lake Nyos.

The lake is very deep and contained a very large volume of stratified or layered water. When these layers become unstable through seasonal turnover, the CO_2 is circulated to upper layers where it is released from the water in non-catastrophic events.

However, Lake Nyos existed in long-term physical and chemical equilibrium resulting in stratified lake waters with very high CO_2 concentrations. Either the addition of simply too much CO_2 (the water was supersaturated in CO_2) or external mechanical forces (underwater land slip or earthquake) caused the equilibrium of the lake to be disturbed.

This disturbance caused the stratified lake layers to mix and the CO_2-rich waters were suddenly exposed to lower pressures and became unstable. This sudden destabilisation caused large amounts of the CO_2 to be released out of the lake as a gas burst.

This event is not the only sudden release of CO_2 from a lake that has been documented. Lake Monoun, Cameroon, only 100km away from Lake Nyos erupted in 1984, releasing a large volume of gas, this time, into largely unpopulated areas.

Does Lake Nyos suggest that geosequestration is unsafe?

The answer is no. In Australia a site selected for CO_2 geosequestration would lack any of the readily identifiable natural pathways or the volcanic activity that is present in Cameroon.

The potential storage sites currently being explored by CO2CRC have:

- simple geology to avoid movement and leakage of CO_2;
- the capacity to store the CO_2 deep beneath the Earth's surface (at least 800m);
- the right sort of permeable rocks to absorb the CO_2; and
- the necessary rocks to trap or seal in the CO_2.

Our research to date strongly suggests that in many of Australia's sedimentary basins CO_2 emissions could be safely stored in the subsurface for thousands of years and longer.