

SAVING FOULDEN MAAR



University students searching for fossils at Foulden Maar near Middlemarch. Photo: Daphne Lee

The fight to preserve the ancient fossils of Foulden Maar. By **Seabourne Rust**.

There are two German Earth science terms that will have become better understood by many Kiwis following recent events in Otago. One is maar, a volcanic crater formed in a single explosion in an area of low relief, typically containing a lake. The other is a lagerstätte, a type of paleontological site noted for its exceptional preservation of its fossils.

The first lagerstätte be recognised in New Zealand is at serious risk. It contains a trove of fossils of crucial importance to the understanding of the history and evolution of life.

Foulden Maar is situated on private farmland near Middlemarch in eastern Otago. This was a very different place 23 million years ago during what we geologists call the earliest Miocene. It was a time before the Southern Alps, when the climate was probably wetter and warmer than today, and a lush sub-tropical forest covered the region.

The maar was formed when a volcano erupted onto the schistose landmass and created a deep crater lake, about 1km across, that slowly filled with fine sediment, especially diatomite. What is diatomite? It's the fossilised remains of water-borne, single-cell, algae called diatoms, microscopic skeletons of which are composed of silica.

Importantly, the lake bed was devoid of oxygen (anoxic) allowing for the spectacular preservation of organic material as fossils. A team from the Geology Department of the University of Otago, and others, have been studying the site for a number of years.

This work revealed the 120m+ thick sediments of the maar span a period of some 120,000 years and provide a unique and rare window into the past – an archival record



A reconstruction of the lake at Foulden Maar 23 million years ago. Illustration by artist and ecologist Dr Paula Peeters.

of the climate, terrestrial and freshwater life of ancient Aotearoa New Zealand.

There are remains of leaves, flowers, pollen, spiders, insects, early galaxiid fish. And there is much more to be discovered.

"From a scientific perspective we don't yet know the importance of what it contains," says University of Otago geologist Professor Daphne Lee.

"This is New Zealand's pre-eminent fossil terrestrial site of the Miocene age and is most impressive.

There are few others like it. A similar site in China is essentially a museum now." Last year scientists were assured by the landowners, Plaman Resources, that they would continue to have access to the maar for research. But a report by investment bankers Goldman Sachs that was leaked to the *Otago Daily Times* in May suggests the company intends to fully mine the site later this year.

The Australian-based but largely Malaysian-owned company is reported to have received a \$30m loan to create an open-pit mine at Foulden Maar. It wants to dig up the fossil-containing diatomite deposits – and turn them into cattle and pig feed.

This increased industrial activity will destroy the maar and have considerable impacts on the local rural community and infrastructure. A proposed 500,000 tonnes of diatomite a year would need to be trucked off the site to a processing plant near Milton, 100km away.

A petition has been launched asking the Government to reject Plaman Resources' application, currently with the Overseas Investment Office, to purchase the neighbouring farm, which would improve the viability of its proposed mining operation.

Campaigners also want the Government to acquire the land currently owned by Plaman Resources and turn Foulden Maar into a scientific reserve under section Section 21 of the Reserves Act 1977.



A perfectly preserved *Litsea* leaf found at the site. Photo: John Conran

→ Please sign the petition to stop the proposed mining at the maar, see <https://our.actionstation.org.nz/petitions/save-foulden-maar>.

■ Dr Seabourne Rust is a paleontologist and writer with an interest in New Zealand's natural history.