

Going to the ends of the Earth for phosphate

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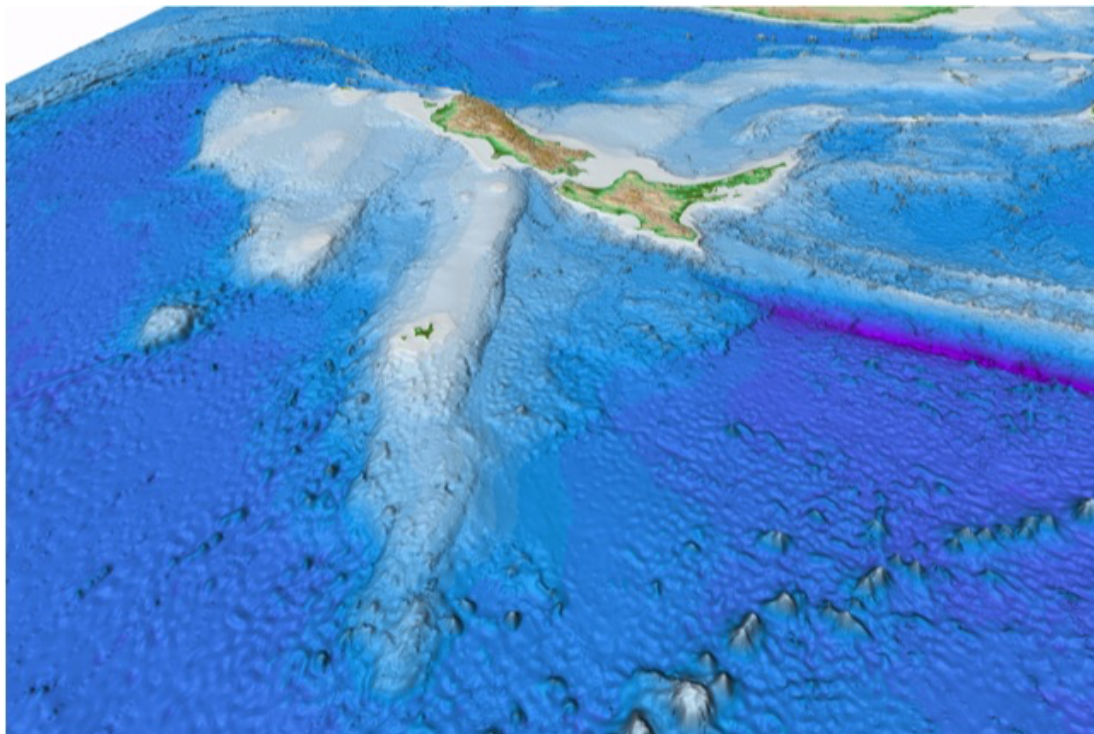
Today, we're focusing on commodities again – because they're an essential investment story. But, before you read the article, please do check out our special commodities report. It won't be appearing in *Exponential Investor* – so you'll have to read it online. It's all about "white diesel", and you can get it [here](#).

Today, we're talking about a commodity we've [covered before](#) in *Exponential Investor*: phosphate. It's a crucial story – both for investment, and for the future of humanity. Phosphate is different from the other major fertilisers, as it's in limited supply. More worryingly, this supply is highly concentrated in just a few countries – such as Western Sahara. This gives producer countries the opportunity to form a cartel – enabling them to cut supply, to spike prices. This was the trick Opec pulled in the 1970s, and it led to the oil crisis. If that happened with phosphate, we'd be in the grip of a new global oligarchy. That new world order would bring a global famine – one which would likely kill millions.

You might think that's a far-off prospect – but there are already signs of trouble. Recently, Western Sahara seized a phosphate-carrying ship in South Africa. This was because of a legal dispute over the mineral rights.

We desperately need new sources of phosphate – ideally large ones, in politically-stable countries. Today, we're talking to a man with access to just such resources. His mine is in quite an unexpected place. Not only is it as far as you can get from the UK (it's in New Zealand) – but it's also in a surprisingly-inaccessible location.

As regular readers of [Exponential Investor may already have guessed](#), it's at the bottom of the sea. Without further ado, I'll hand you over to Chris Castle, chief executive of Chatham Rock Phosphate. He'll be telling you how we'll keep food on your children's plates, in coming decades.



New Zealand showing Chatham

Rise in the foreground

AL: Hi Chris. Can you start off by giving me some initial idea of the scope of seabed mining?

CC: Extraction of seabed phosphate is planned in places as diverse as offshore New Zealand, Mexico and Namibia.

These projects are currently undergoing permitting. In future, they will have the ability to help offset the vulnerability to economic and political events in the six countries controlling 98% of the world's phosphate reserves. 85% of this total is in Morocco.

AL: Why are these resources being developed?

CC: Undeniably these are attractive investments. As an example, we can consider the Chatham Rise project being developed by

Chatham Rock Phosphate – that's a firm I'm a founder of.

A key reason for the strong profitability is the location of the resource close to New Zealand – meaning no incoming freight costs. Extraction costs equate to that of shipping phosphate from the other side of the world, so the international price has to collapse to near zero before the company can't compete. Companies are therefore obviously looking for new sources of phosphate closer to home, that don't involve such huge transport costs.

Furthermore, everyone's mindful of the potential for supply disruption – so having control over resources is important. Additionally, companies need material which is clean, in terms of toxicity. The Pacific has limited supplies of phosphate and New Zealand imports all of its requirements – mostly from Morocco.

Investors have other areas of focus as well. Some are excited by the "frontier" concept of deep-sea mining. Some like the fact that Chatham's product offers environmental benefits – something not usually associated with mining projects.

Others see the importance of reducing the reliance on such a heavy domination of resources by a few countries in politically-unstable areas. It is worth noting other countries with their own resources, such as the United States and China, have restricted exports – recognising the strategic nature of phosphate.

AL: Tell me about the ship carrying rock phosphate that was seized recently in South Africa.

CC: This is really quite interesting! It relates to rock phosphate shipments, by the Moroccan company OCP. These come from its mines in the Western Sahara. The Western Sahara has been under armed occupation by Morocco since 1975. Despite this, the trade has continued – despite the 1991 commitment of the United Nations to ensure Western Sahara benefits from self-determination.

In early May, the Western Sahara liberation movement announced the interception and detention of a shipment of phosphate rock exported from Western Sahara. This was done through legal means, in South Africa. The ship had been destined for a New Zealand importer. As both New Zealand fertiliser manufacturers source most of their phosphate rock from the same source, the implications for New Zealand farmers and the agriculture sector (the backbone of our economy) are potentially serious.

This is just the sort of supply disruption that we thought might happen. It underlines the strategic value of our deposit. Additionally, our mineral also has significantly lower levels of cadmium than the rock phosphate coming from the mines in the Western Sahara. To put it in a nutshell, Chatham offers a secure, ultra-low cadmium alternative supply of rock phosphate – with no associated ethical baggage.

AL: How important is seabed mining for the future of the world's resource dependency?

CC: While there are significant land-based phosphate resources, they are controlled by a small number of countries, including disputed territories. So there is a strong motivation to develop alternative sources. Phosphate is also a bulky product to transport, so if resources can be located closer to where they will be used, that vastly improves the financials of such projects.

Other ocean resource projects include copper, gold and other minerals. These are contained in massive sulphides in the mid-Pacific, alluvial gold reserves that have washed into New Zealand harbours, and iron ore in seabed sands off the west coast of New Zealand.

Just as sustainable fish farming is becoming an important alternative to harvesting wild fish, untapped mineral resources within the world's seas will rapidly become important. It will play a part in meeting the demands of a world whose population is forecast to reach 9.6 billion by 2050, with an increasing proportion achieving a 21st century life.

The amount of arable land available to grow food for the increased world population is dramatically reducing due to urban spread and the loss of soil into stream and rivers. At the same time global food production will need to increase over the next 35 years by 70%. So the remaining land needs to become more productive. At the same time, more intensive land use is causing deforestation and reduced biodiversity, soil erosion, depletion and pollution, flooding and water pollution, and food contamination.

As land-based resources become harder to extract, seabed mining becomes more attractive. For example the economics of the Chatham Rise phosphate resource stack up well a of remote on-land resources, which are usually located well away from road or rail facilities. This means they require extensive infrastructure to bring them to market.

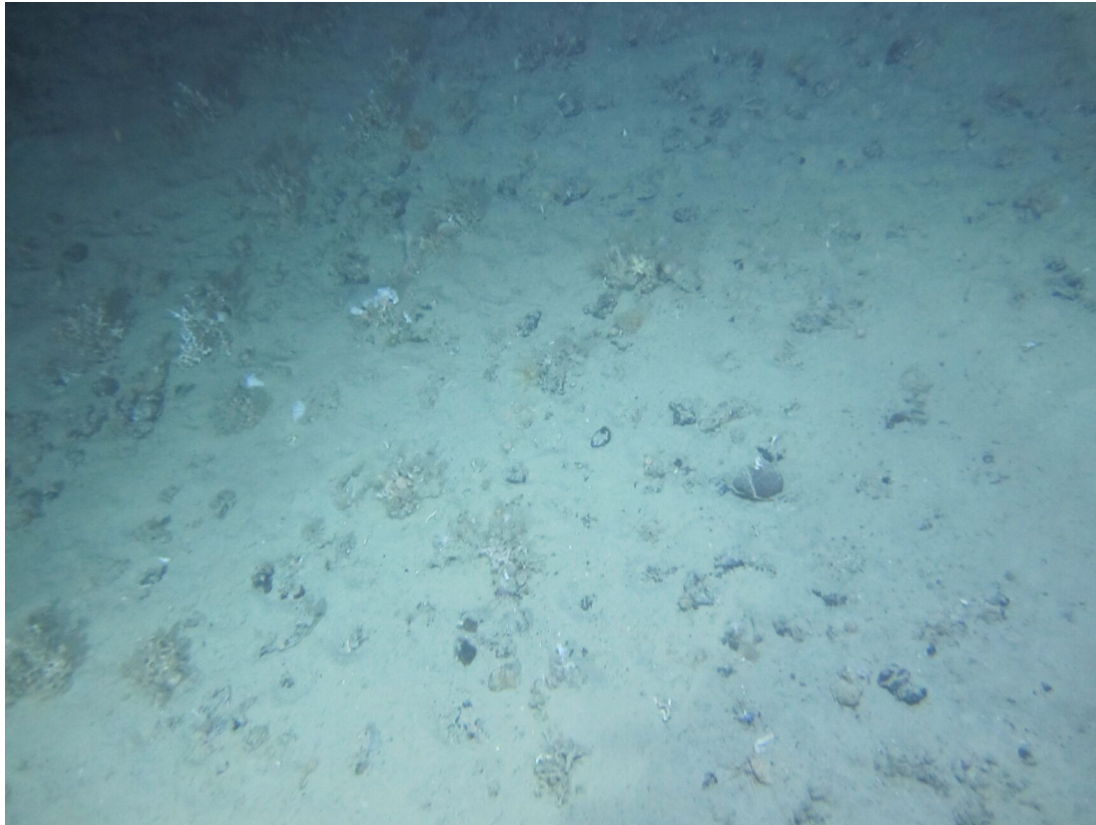
One of the key attractions of seabed activities is the infrastructure is portable (on ships) and so once the extraction is complete, it sails away, with no physical evidence remaining. That also benefits the financials, as the infrastructure can be repurposed for other projects. In addition, seabed mining projects are generally well away from human populations.

Marine technology is rapidly advancing. Over centuries, Europe's lowland countries have developed expertise to protect their borders from sea encroachment. They are using that technology and knowledge for projects as diverse as building islands in the Middle East, removing toxic waste from US river soils, and widening canals to improve access to some of the world's most famous shipping channels.

AL: Will marine mining solve resource shortages in the long term?

CC: No resource is endless and few are fully sustainable. Resources need to be carefully extracted and managed. But human endeavour continues to source and repurpose resources. For example, a generation after the 1970s oil shocks, the world has found large new oil reserves. These include shale oil, and undersea reserves. Furthermore, industry is now finding alternative sustainable energy sources, to reduce dependence on traditional sources.

AL: Returning to the particular resource we discussed earlier, can you talk in more detail about what you're planning on mining?



Phosphate nodules on the

Chatham Rise seafloor

CC: The phosphate deposit was formed in nodules on the Chatham Rise. It's about 450km east of New Zealand, and lies in a half-metre layer on the seabed. It's in water that's 400m deep. This was laid down millions of years ago, and discovered in 1952 by New Zealand scientists.

Over the following four decades, public and private sector experts identified the potential for decades of supply of phosphate to nourish New Zealand farms.

Chatham became the current custodian of this resource when world phosphate prices soared in the mid-2000s. The Chatham business case is based on a resource with an estimated worth of \$5 to \$7 billion, making it one of New Zealand's most valuable mineral assets and of huge strategic significance because of the country's heavy reliance on agriculture.

Three people closely associated with the project (a director, our COO and a key adviser) were involved in scientific research for the project in the 1970s and 80s. As founder, I want to see a natural product from the ocean used to environmentally benefit New Zealand's most important industry. I think the project has tremendous financial potential, but I'm also excited by the prospect of seeing technical innovation in action.

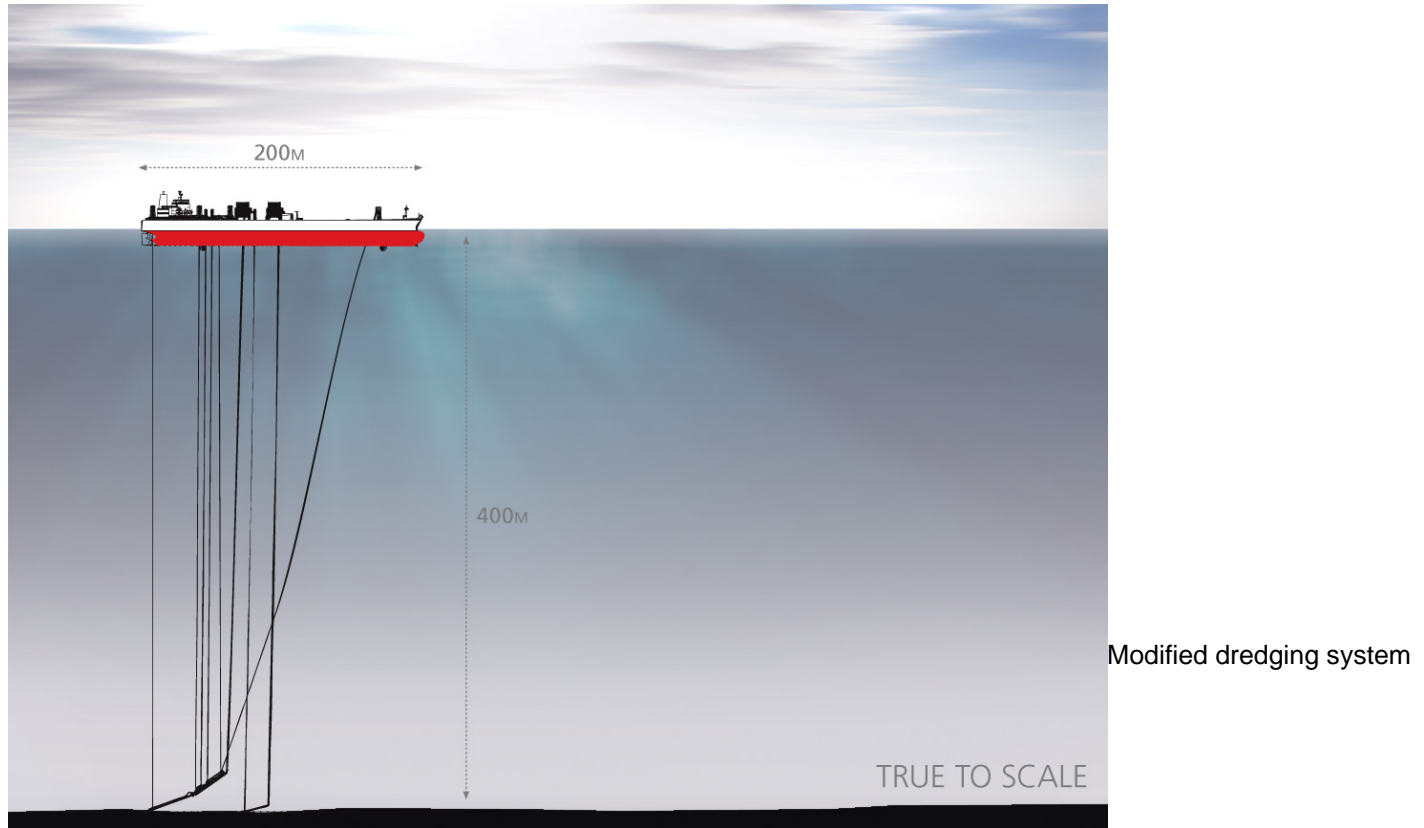
My background is in investment and capital raising, primarily in the mining sector, but my main motivation with this project is in being able to harness that environmental, technical and financial potential.

In 2013, after a detailed evaluation, Chatham gained a 20-year mining permit covering 820km². It is now developing plans to

renew its application for an environmental consent in 2017. Iron ore seabed miner Trans-Tasman Resources has just resubmitted its environmental consent application under the same legislative framework.

Chatham also has applied for prospecting licences for offshore Namibian phosphate resources.

AL: Has any company mined seabed deposits at that depth before?



CC: There has been considerable ocean mining since the 1970s, including some at much greater depths. Chatham is proposing to use conventional dredging techniques using a leading marine services company. The extraction technique uses a modified dredging vessel equipped with a suction device on the seabed to vacuum up the nodules and associated sand, bring the material up on to the ship, separate the nodules (screening by size) and gently deposit the unwanted sand back on to the seabed from where it came.

The mining process will impact on bottom-dwelling organisms in the area being mined; however, detailed modelling of the plume generated by material being returned to the seafloor has established that the plume stays within the area being mined.

AL: How does Chatham rock phosphate differ from other sources?

CC: The rock is a very effective form of fertiliser, in that it binds to the soil. When applied directly, it reduces phosphate leaching into waterways by factor of ten.

As you may know, cadmium is a key contaminant of phosphate resources. It's toxic, it accumulates in plants, and it's very expensive to remove. The cadmium levels in Chatham Rise rock phosphate are among the lowest in the world, with an average of 2.2 parts per million. This compares with the voluntary limit of 280 parts per million, which New Zealand fertiliser companies achieve for manufactured superphosphate.

Cadmium is a naturally occurring heavy metal. New Zealand has heightened levels of cadmium in some of its soils from using previous sources of phosphate. High levels of cadmium can cause kidney failure and bone damage and has been statistically associated with an increased risk of cancer. Food is the dominant source of human exposure in the non-smoking population.

Excessive levels of cadmium in soils can restrict land use. New Zealand's Ministry for Primary Industries (MPI) is managing the gradual build-up of cadmium in New Zealand soils through the cadmium contained in imported phosphate. The build-up of cadmium levels in sheep has caused MPI to ban the export of some offal from animals older than two and an half years.



150mm but mostly less than 8mm

AL: What other benefits do alternative phosphate sources have?

CC: Using this local source of rock phosphate would also reduce New Zealand's carbon footprint by avoiding transporting the product from the other side of the world and benefit the country's balance of payments and foreign exchange exposure.

It will provide New Zealand with a secure long-term sustainable local supply of rock phosphate and avoid exporting our environmental footprint to countries where mining phosphate involves severe social and environmental distress in disrupted territories. For example: dust generated by terrestrial phosphate mining regularly severely impacts local villages.

There are some wider benefits for New Zealand as well – such as high-value jobs in the selected port, and on the mining ship. In addition, there will be roles undertaking environmental monitoring and broader scientific research. Looking after the ship and crew means that there will be opportunities in a diverse range of support industries – particularly on the Chatham Islands, which is the nearest land mass to the resource. There will also be an economic boost in the agricultural sector. All this can occur without any significant impact on fishing yields or profitability, and without affecting marine mammals or seabirds.

In addition this project would enable New Zealand to become a world leader in this particular marine technology and expertise. This could potentially be worth billions of dollars. Furthermore, there's a knowledge benefits, too – enhancing understanding of

New Zealand's marine environment. This will help identify priority conservation areas.

AL: Why was Chatham's initial application turned down?

CC: Chatham's application was turned down on limited, unexpected and relatively minor issues we are confident can be dealt with robustly on resubmission.

The application was only the second under new legislation, which was still "coming up to speed". Since then the two main applicants and the Environmental Protection Authority, which assessed the applications, have learned a lot. It is expected this will be translated into improved application and hearing processes. Once Chatham has reapplied, the process is limited by statute to six months. There are no other significant hurdles to be negotiated.

Well, that's certainly food for thought – and hopefully for your plate, too. I'm always one to keep an eye out for the unforeseen. Not only does it make *Exponential Investor* a bit more interesting, but it helps me plan my investments – and my survival. You can't really get a more important story than this. Please do send your thoughts – andrew@southbankresearch.com.

Finally, don't forget to check out our "white diesel" report. [You can get it here](#).

Best,

Andrew Lockley
Exponential Investor