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Sadie's Place Flickr/ CC BY-SA 2.0 **The consequences of a dwindling, forgotten mineral can be the world's next inconvenient truth.**

- The world's food supplies as reserves of phosphate rock, the main source of phosphorus used in fertilizers, are running out and the impacts can be immense. This is the gist of a recent article written by SEI researchers Arno Rosemarin and Ian Caldwell together with senior sanitation advisor Gert de Bruijne from WASTE, a Dutch organization advising on sustainable improvement of the urban environment.

The article, entitled **The next inconvenient truth: Peak phosphorus** was recently published in The Broker and warns that the current trajectory can lead the world into uncharted territory.

Current trajectory not sustainable

Phosphorus is an essential nutrient for all plants and animals. It is also one of the three key components (together with nitrogen and potassium) of fertilizers, and so is crucial for the world's food supply system. With continued population growth, improving diets and rising global demand for food and biofuels, the need for phosphate fertilizers to improve crop production will only increase.

A failure to curb the extravagant use of fertilizers will lead to an unsustainable outtake of natural phosphorus which will send ripples of unease into the global food production sector. As these reserves decline, the impacts will be immense, including falling farm output, higher food prices, growing food insecurity and escalating social and economic challenges for which the world is unprepared.

- Within a few decades, global economic development could be constrained not just by supplies of oil, but by the availability of phosphorus. Based on the data that are available, it is clear that alarm bells should be ringing, they warn.

US Reserves run out within 30 years

Reserves of phosphate rock are found in several countries, but the largest commercially recoverable reserves are located in just three – China, the United States and Morocco/Western Sahara (see picture below). At current rates of extraction, the US will deplete its reserves within 30 years, and global reserves will start to run out within 75–100 years.

- Phosphate extraction will peak around 2030, after which time demand will exceed supply, the authors say.

Manufacturing phosphorous from alternative sources is impossible, however it can be recovered and reused. Some can be recovered from human, animal and organic waste, but as yet there have been few initiatives to promote recycling.

Little learned from experience

High demand for phosphate means higher prices, ultimately causing food prices to rocket. In 2007–8, the price of phosphate fertilizer unexpectedly increased fivefold, due partly to the growing demand for biofuels to replace oil. The use of fertilized crops to produce biofuels such as ethanol pushed fertilizer into a pricing structure determined directly by the soaring price of oil. The result was a surge in food prices, and even conflicts in some developing countries where farmers could no longer afford to buy fertilizers.

Prices might have remained high, had it not been for the economic recession that began to bite in late 2008. As the demand for biofuels fell, so did the need for fertilizers, and so did world prices.

- The rapidity of the events of 2008 prevented any changes in policies with regard to fertilizer or agriculture, and little was learned from the experience. What did become apparent, however, was that the fertilizer industry is highly vulnerable because of the link to biofuels, and that many developing countries cannot afford conventional chemical fertilizers. Clearly, the knock-on societal effects of spiralling fertilizer prices need to be better understood if we are to respond effectively when the next major price shift occurs, the authors say.

Public awareness must be raised

Rosemarin, Caldwell and de Bruijne call for innovative strategies and wide-ranging agricultural policy reforms in order to reduce the demand for phosphate fertilizers. As fertilizer prices rise, the increased inequality of access between rich and poor countries will have major geopolitical impacts. This makes supplies of phosphate one of the most pressing global resource questions, one that requires urgent attention, they argue.

- So far there has been little acknowledgement, let alone response, from governments, UN agencies or international NGOs to the world's dwindling phosphate reserves. Efforts must be made to improve public awareness of the problem. Most people acknowledge that mineral resources are scarce, but assume that more will somehow be found, the researchers argue, stressing the fact that perhaps the most effective way to minimize the impacts of phosphate shortages would be to promote the recovery and reuse of phosphorus and other nutrients from organic waste and wastewater streams and to use phosphorus fertilisers more efficiently, Rosemarin, Caldwell and de Bruijne conclude.