The Story of

Phosphorus

Sustainability implications of global phosphorus scarcity for food security

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The story of phosphorus began with the search for the philosopher's stone, and centuries later the critical role of phosphorus in soil fertility and crop growth was highlighted. Eventually, phosphorus was implicated in the global environmental challenge of eutrophication. Now, we are on the brink of yet another emerging chapter in the story: global phosphorus scarcity linked to food security.

In a world which will be home to nine billion people by the middle of this century, producing enough food and other vital resources is likely to be a substantial challenge for humanity. Phosphorus is an essential plant nutrient which today is applied to agricultural soils in fertilizers to maintain high crop yields. Phosphorus has no substitute in food production. Therefore, securing the long-term availability of and accessibility to phosphorus is crucial to global food security.

Through a transdisciplinary and systemic inquiry, this thesis analyzes the many ways that global phosphorus scarcity poses a serious threat to future food security: from imminent peak phosphorus to ineffective global governance. In order to avert a 'hard-landing' situation, substantial changes to physical and institutional infrastructure will be required. This thesis proposes a new global goal – phosphorus security – to guide future sustainable improvements.

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