

Review: Enriching the Earth: Fritz Haber, Carl Bosch, and the Transformation of World Food Production

By Vaclav Smil

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Vaclav Smil. *Enriching the Earth: Fritz Haber, Carl Bosch, and the Transformation of World Food Production*. Cambridge, MA: The MIT Press, 2001. 338 pp. ISBN 0-262-19449-X (hardcover). US\$34.95. Alkaline paper.

Vaclav Smil admits in the postscript of this book that he had planned originally to write a biography of Fritz Haber. He does in fact include a summary of both Haber's and Carl Bosch's lives in the postscript, but the book itself is dedicated to the discovery, marketing, and consequences of the synthesis of ammonia. The book is interdisciplinary; with individual chapters being of interest to specific groups, but with its historical overview will appeal to a wide group of readers.

Enriching the Earth follows Smil's previous books that address the world's energy needs, ecology, and food production. The goal of his previous work, *Feeding the Earth: A Challenge for the Twenty-First Century* (2000), is to examine the problem of feeding the ten billion people estimated to inhabit the earth by the mid-21st century. Here, Smil argues against Paul Ehrlich's and Lester Brown's claims for global catastrophe regarding world population and survival rates, surmising that by 2050 the world's human population will cease to grow for reasons other than food production.

In *Enriching the Earth*, Smil examines the effects of higher food production efficiency worldwide. The main focus of the book is on the discovery of ammonia synthesis in 1908 by Fritz Haber, and the commercialization of it by Carl Bosch and BASF (the Haber-Bosch process). With their emphasis on the nitrogen needs of plants, specifically food crops, the first chapters take the reader through an historical survey of what is known about nitrogen. Smil explains the nitrogen cycle and its sources (old and new). He then focuses on Haber's discovery of the synthesis of ammonia, the creation of the ammonia industry, the innovations that developed from the first synthesis, and the production of synthetic fertilizers. The concluding chapters concentrate on how dependent civilization has become on nitrogen and addresses some of the problems that this dependence has created.

Smil acknowledges that the abundance of fixed nitrogen has had many undesirable consequences, and outlines them throughout the text. It is illuminating to discover that the level of reactive nitrogen in the global

biogeochemical cycle exceeds that of carbon, but that studies concerning anthropogenic interferences in fertilizer-induced disturbances in the nitrogen cycle instill less interest than those in both carbon and sulfur cycles.

Smil supports his assertions that the end to global population growth will not be brought about by food production by stating that,

As a result [that the global harvest of staple cereal crops, as well as the total production of crop-derived food energy, has expanded sevenfold], never before have so many people-be it in absolute or in relative terms-enjoyed such an adequate to abundant supply of food. Continuing malnutrition and stunting are caused by unequal access to food rather than by absolute supply shortages. (p. 199)

This argument counters other opinions that drought and crop failure are the main causes of malnutrition and hunger.

Unless you are an expert in the field, you will need to set aside time to read this book. The text includes some highly technical information, with statistics, chemistry, and facts which can be laborious to read and difficult to digest. However, although the book topic may appear to a layperson to be somewhat daunting, it is well worth reading as it gives insight to an event in history that equals, or perhaps exceeds, the most important technological innovations of the 20th century.

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