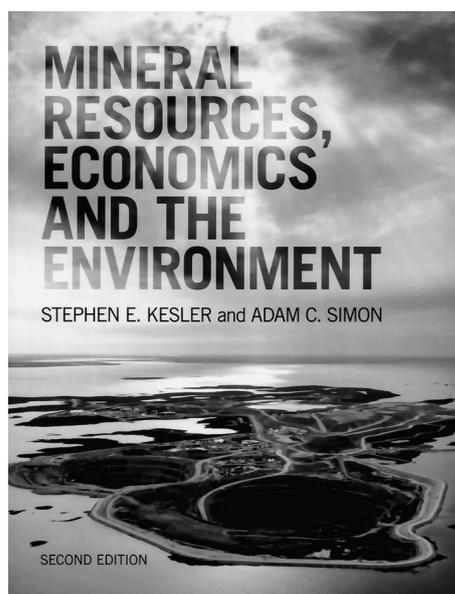


Mineral Resources, Economics and the Environment, by S.E. Kesler and A.C. Simon, 2015. Cambridge University Press, Cambridge. 434 pages. Hardback: price GBP 49.99. ISBN 987-1-107-07491-0.



The present tome is a compendium of current knowledge of mineral resources and methods of exploration, in relation to economic and environmental aspects. The authors outline these issues by presenting mineral resources in different countries, albeit within the context of global changes in demand, consumption and use of raw materials.

There are 14 chapters, all of them compact. The initial ones (chapters 1 to 4) provide an introduction to the topic by a concise outline of genetic processes leading to the formation of deposits ('Origin of mineral deposits'). In addition, they define the most important elements of environmental geochemistry and research methods in studies of environmental pollution ('Environmental geochemistry and mineral resources'), as well as the basic methods of mineral exploration, processing and production ('Mineral exploration and production'). Chapters 5 and 6, entitled 'Mineral law and land access' and 'Mineral economics', respectively, discuss legal aspects (often complex), including topics on ownership of deposits, land and mining areas, tax payments,

changes in commodity prices, operating costs and company profits.

Economic conditions of mineral extraction are presented in relation to the location of deposits on different continents, but with special emphasis on US economy. Differences with regard to types of deposit ownership in North and South Americas, Europe, Australia and New Zealand are discussed. The authors indicate the need for appropriate strategies by governments and institutions responsible for deposit exploration, in view of the rational tapping into them. This applies in particular to deposits that are situated in protected areas and in regions that are jointly owned by a number of countries (e.g., seas and oceans).

Subsequent chapters refer to particular types of minerals. Chapter 7 ('Energy mineral resources') discusses energy minerals, among which are the following: fossil fuels (coal, oil and gas) as well as non-fossil resources (e.g., nuclear and geothermal energy). In addition to characteristics of the world's major deposits, this chapter summarises present-day resources, recovery methods as well as risks associated with the extraction of such minerals.

Chapter 8 entitled 'Iron, steel and the ferroalloy metals' contains updated information on the geology and distribution of deposits, as well as on applications and production of iron, chromium, nickel, manganese, molybdenum, vanadium, tungsten and niobium. Their with the 'Technology elements' describe the main resources as well as technological and economic conditions of the selected basic (e.g., aluminium and copper) and rare metals (e.g., lithium, rare earths). They contain current resources and distribution of deposits and the use of this group of metals in various rapidly growing fields in society. In Chapter 11 ('Precious metals and gems') the authors briefly discuss the distribution and resources of gold, silver, platinum and platinum group elements, as well as selected precious stones such as diamonds, emeralds and rubies. The periodic de-

mand for this group of minerals and the increased use of precious metals in industry is outlined.

Chapter 12, 'Agricultural and chemical minerals', is dedicated to raw chemical materials, in particular carbonate and phosphate ones, while Chapter 13, 'Construction and industrial minerals', characterises clays (including kaolinite, talc and bentonite), raw materials for construction ceramics (cement), as well as feldspar, gypsum and barytes. Particular attention in this chapter is devoted to specific properties of this group of raw materials which ensures the high demand for these minerals on the world market. In the final chapter, 'Global mineral reserves and resources', the authors present methods for estimating global resources and annual production of minerals (according to 2014 data).

Each chapter is concluded by a brief summary of the extraction of different groups of minerals in the near future, providing additional indications of the possibility of maximum utilisation of mineral resources with minimum negative impact on the environment. The reader has the opportunity to learn about the projected path of development of new technologies from top-notch experts.

The great advantage of the present book is its very careful layout. In addition to the current map of mineral distribution across the world, there are diagrams showing changes in production over decades, charts illustrating trade in mineral resources by individual countries, as well as many simple diagrams relating to mineral processing. Schematic drawings illustrate the genesis of deposits and the impact of their extraction on the environment well. Exceptionally some data are erroneous; for example, in Figure 11.10 the origins of the Lubin deposits are indicated to be of the Mississippi Valley type,

rather than the Kupferschiefer type. Colour photographs, collected on 32 pages in all, attract attention as well, in being very pictorial, not only modern but also historic; unfortunately, not all are of good quality.

Each chapter briefly presents data so as to enhance the reader's grasp in the form of boxes featured in the text with a frame and background colour, making it easy to remember and offering a chance to arrange issues discussed systematically. Extremely valuable are the appendices, which include lists of ores and useful minerals with their applications, units of measure of minerals (and conversion to other units of weight and measures), as well as a glossary of specialised terms used in the book.

This is an extensive, yet not boring, textbook for MSc students in geology and related sciences. Such a course requires knowledge of the basic concepts and geological processes, which are discussed rather briefly in the present tome. A particular advantage is that it presents issues related to mineral resources in a multi-faceted manner and in relation to legal regulations. Difficult questions of overlapping fields of geology, law and environmental protection are discussed by prominent and experienced experts on the subject of mineral resources in an extremely interesting way. This book is highly recommended, not only in view of the geology, but also the protection of deposits and their environment, as well as the indisputable need for prudent management of the riches of planet Earth.

*Agata Duczmal-Czernikiewicz
Adam Mickiewicz University, Poznań, Poland
e-mail: duczer@amu.edu.pl*