

Development of Integrated Phosphorus Cycle Input Output Model and Its Applications

Topic: Physical and hybrid input-output tables 2

Author: Kazuyo Matsubae

Co-Authors: Jun Kajiyama, Keisuke Nansai, Kenichi NAKAJIMA

Phosphorus is present only as a trace element on the Earth, but is one of the important strategic resources for agricultural food production and for the chemical industry. Natural phosphate ore is traded worldwide, mainly as a raw material for fertilizer. Approximately 147×10^3 kt of phosphate ore was mined in the world during 2005. Of this, 24.7% (36.3×10^3 kt) was produced in the USA, 20.7% (30.4×10^3 kt) in China, and 17.1% (25.2×10^3 kt) in Morocco, while there are essentially no deposits of phosphate ore in Japan or the EU. It is of concern that, due to growing world demand for fertilizers, deposits of high-grade phosphate ore could be exhausted within the next 100 years, and the average price of the ore in 2008 was approximately doubled that in 2007. Concerning the restricted supplies of phosphorus resource, it is important to consider the quantity and availability of phosphorus resources that currently remain untapped.

With this in mind, we developed the Integrated Phosphorus Cycle Input Output (IPCIO) model to estimate the phosphorus requirement for economic activities and evaluate the recycling effects of reutilization of phosphorus resources which are currently untapped. The accounting framework of IPCIO has 4 natural resources and 25 phosphorus related commodities in physical term and 389 intermediate sectors of the Japanese economy in 2005 year. As empirical studies, phosphorus recovery and recycling scenarios are considered for future phosphorus resource management.