



## Preface

Phosphorus (P) is one of the most critical elements of biological building blocks and plays a crucial role in the cellular energy metabolism of all living organisms. Since no other element can substitute for P in biochemical processes, humans ultimately rely on P availability. Modern farming relies heavily on phosphorus, which is derived from phosphate ( $P_i$ ) fertilizers, to enhance agricultural production in soils. Therefore, P availability is critical to our present and future food security. Moreover, P is widely used in industry as an essential element. It constitutes an important raw material for a variety of industrial products, including electronics, chemical catalysts, food additives, flame retardants and pharmaceuticals.

Asia, the largest continent in the world, where 60% of the current global population resides, is now the largest consumer of  $P_i$  rock and fertilizer. The two most populous countries, China and India, are the largest consumers of P fertilizers, accounting for about 60% of global consumption. Furthermore, Asia's rapid growth and fast economic development are increasingly boosting P demand in the region. Although China holds large  $P_i$  rock reserves, large parts of Asia are almost totally dependent on imports of P from other countries. South Asia, in particular, has the largest global share in  $P_i$  rock imports, at approximately 25%. Since P use in Asia can have enormous leverage over global food security, a solid understanding of P flows, fertilizer applications and the implementation of P recycling in Asia is critical for achieving global P sustainability in the future.

This special issue deals with the sustainable use of P in East and South Asian countries, including China, Korea, Taiwan R.O.C., Vietnam, Thailand and Japan. China is the largest producer and consumer of P in the world. Korea, Taiwan R.O.C. and Japan are relatively large consumers, depending almost entirely on imported P. Thailand and Vietnam possess the highest growth potential for the fertilizer industry in Asia.

Most of the contributions to this special issue are extended versions of papers presented at the 1st and 2nd International Workshops on Sustainable P Governance from Asian Perspectives. The workshops were held at Tohoku University, Sendai, Japan, May 28, 2012 and at Keio University, Yokohama, Japan, November 20, 2012. They were organized by Dr. Kazuyo Matsubae and Prof. Tetsuya Nagasaka of Tohoku University and supported by Japan's Ministry of the Environment and JST-RISTEX. The papers have been significantly expanded in content by the authors to highlight emerging issues in P use in Asia.

This special issue is the first collection of papers dealing with sustainable P use from Asian perspectives. We would like to express our great appreciation to those who contributed to the success of the workshops and this special issue. We would also like to extend our sincere thanks to Professor Hiroyoshi Higuchi of Keio University and editorial board members of the journal for giving us the opportunity to guest-edit this special issue. Last, but not least, we wish to thank Mrs. Ryoko Morimoto, who helped us publish this special issue. We hope that this issue will provide a valuable reference and perspective to sustainable P use in Asia.

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