Global TraPs

Global transdisciplinary **p**rocesses for sustainable **p**hosphorus management (2010–2015)

Newsletter 7

February 2012

4th Global TraPs Workshop – a groundbreaking event

In just two weeks time, the Global TraPs community will meet in El Jadida, Morocco for the project's upcoming milestone, the 4th Global TraPs Workshop. We are looking forward to welcoming over 80 experts from academia and practice, equally distributed between both fields. Top scientists from over 30 different institutes, experts from mining- and fertilizer industry, international- and governmental organizations, such as UNEP, FAO, IFA, USGS, BGR and non-governmental organizations (IISD, Greenpeace, Coalition Clean Baltic, etc.) will be among the attendees. The workshop in El Jadida will be the first opportunity to actively involve farmer organizations. Representing hundreds of millions of smallholder farmers all over the world, the delegates of the farmer organizations will present their main concerns to the plenum and play a central role in the Use Node discussions on food security and human well being.

The 4th Global TraPs workshop and its outcomes are decisive for the future of the Global TraPs project. In El Jadida, the transition from the first phase of conceptualization to the core phase of case study finalization will be initiated. In the Morocco workshop, the focus is on the identification of the case studies for the different nodes. The results of the case studies attempt to fill in the knowledge gaps identified during the last 1.5 years. The core phase of Global TraPs will also include two world conferences in 2013 and 2015 where high-level decision-makers in policy and politics, industry, science and development will be involved and the important outcomes of the research efforts will be presented.

In order to achieve this ambitious objective of policy orientations on transitions to sustainable P management, expectant glances are cast toward the 4th Global TraPs workshop in El Jadida!

Photo: puredestinations.co.uk

The Mazagan Beach Resort in El-Jadida (Casablanca) Morocco

NSSI Natural and Social Science Interface

IFDC

ETH Eidgenössische Technische Hochschule Zürich Swiss Federal Institute of Technology Zurich

News on Springer Briefs

The editorial team of the Springer Brief "Sustainable Phosphorus Management: a Transdisciplinary Roadmap" (tentative title; edited by R. W. Scholz, A. Roy et al.) is moving forward positively. The book is in its first stage of the writing and revision process, in which all node leaders and the editorial team are involved. The editorial team will send a first draft of the Springer Brief to all participants of the 4th Global TraPs workshop before the workshop. Final revising comments will be made during the node sessions of the workshop. The final publication of the Springer Brief is planned for autumn 2012. This book will be a cornerstone for the 1st Global TraPs World Conference which will take place in February 2013.

Estonia has joined Global TraPs

(by Rein Kuusik)

Estonia is a small country with an area of 45 thousand km² and population about 1.3 M inhabitants. Estonian phosphorite resources have been evaluated to be 550–600 Mt of P_2O_5. During the period of 1920–1991 25 Mt of ore was excavated, being then partially enriched in different ways. During the Soviet period the concentrate was mainly used as direct fertilizer. In collaboration with Estonian Geological Survey (R. Raudsep, V. Petersell, H. Liivrand et al), Tallinn University of Technology (TUT, M. Veiderma, R. Kuusik, E. Aasamäe et al.) and other institutions, the complex geological characterization of the deposit was determined, as well the enrichment conditions of ores and technological properties of concentrates have been worked out and clarified. The chemistry of apatites as well as mining and environmental problems of phosphorites have been of continuous interest in TUT (K. Tõnsuaadu, E. Reinsalu, I. Valgma).

Photo: Fotothing.com

Estonia, quarry of phosphorite in Maardu

Currently, several issues have been highlighed by the oil shale processing enterprise Viru Keemia Grupp AS (VKG) and are in the preliminary stage of study, namely: hydrogeological conditions in one particular area (Estonian Geological Survey), distribution of Mg and Fe impurities in phosphorite rock (Tartu University, Geology Section), rock beneficiation and reactivity testing (partner in USA), underground mining technology of phosphates (TUT, Mining Institute) and economics of fertilizer production (VKG). Preliminary contacts with the communities of the deposit area are developing.

Rein Kuusik

Mineral-Economists Science Workshop

For early summer 2012, a Global TraPs mini-workshop on the structure and properties of a sustainable phosphorus market is being arranged in London. The workshop should discuss how the P market is structured and how it is changing due to new market actors and regional hubs. Here, aspects of speculation and destabilizing factors should be identified which may lead to unwanted price and supply dynamics. The expert discussion will reflect on how sustainability for global P trade may be defined and what are properties and characteristics of sustainable/unsustainable P markets. Consultants from important mining companies as well as expert from academia will address multiple questions such as: What unexpected dynamics, spikes or price deterioration may result from the P-market as part of the commodity market or in interaction with energy, the general financial market and other markets? How does this influence the access to P in different parts of the world? The outcomes of the workshop will serve as an important input for the Trade and Finance Node of the Global TraPs project

New Global TraPs Project Manager at Zurich Headquarters

Désirée Ruppen

Since January 2012, Désirée Ruppen has been supporting the GlobalTraps team as a full-time manager. In addition to the administrative and coordinative work, she will be closely involved in the conceptual, scientific, and transdisciplinary drafting of the project. Désirée graduated as a Master of Sciences in Earth Sciences with a Major in Geology and Geochemistry at ETH Zurich in September 2011. Attracted by the broad variety of her news tasks, she is eager to contribute to this interesting transdisciplinary process. Arranging the 4th Global TraPs workshop, she is looking forward to meeting the Global TraPs members in El Jadida!

Doctoral Thesis on Toxic Metal Removal by Apatites

Apatites are able to bind toxic metal ions into their structure and therefore, they are effective sorbent materials for immobilization of toxic metals from contaminated soils and waters. In environmental conditions the sorption process is affected by natural and synthetic complexing agents. **Karin Viipsi's** doctoral thesis "Impact of EDTA and Humic Substances on the Removal of Cd and Zn from Aqueous Solutions by Apatite" considers the toxic metal ions sorption on apatites in the presence of two common complexing ligands. The thesis was composed in Laboratory of Inorganic Materials in Tallinn University of Technology under the supervision of senior research scientist Kaia Tõnsuaadu and collaboration with Prof. Staffan Sjöberg (Umeå University, Sweden).

It was established that the sorption character and extent of Cd(II) and Zn(II) ions by apatite depends not only on the specific surface area of apatite and pH of solution, but also on apatite stoichiometry, cationic composition of solution, as well as on the presence of chelating compounds. In a multi-metal solution, the individually sorbed amount of metals decreases, but the total adsorption extent of apatites is approximately constant. The amount of Cd removed with apatite from solution is not inhibited by soluble humic compounds. The presence of EDTA significantly increases apatite solubility and reduces the sorbed amount due to metal ions complexation in solution. With the help of X-ray photoelectron spectroscopy and thermodynamic modeling, it was found, that cations sorption on apatite occurs in the pH interval 5–7 by ion exchange reaction at the surface of apatite crystals by formation of a new metal-substituted surface layer with a composition $Ca_{8.4-x}Me_x(HPO_4)_{1.6}(PO_4)_{4.4}(OH)_{0.4}$. The regeneration of apatite is possible and reversibility of metal sorption on apatites depends on the composition of extracting solution. The Cd sorbed in the presence of EDTA and humic compounds is more easily removed from apatite at desorption.

In conclusion, hydroxy- and fluorapatites are effective sorbents in processing soil or wastewater contaminated by toxic metals but it is necessary to take into account the presence of chelating compounds that can notably change the character of the binding process and stability of the compounds formed.

Karin Viipsi

Link to the thesis »»

Doctoral Thesis on Visual Representation in Phosphorus Resource Management

The use of visual representation in phosphorus re- source management is being explored by the Global TraPs project, under the supervision of Prof. Roland W. Scholz. It is hoped that a visual animation and an interactive graphical system will be developed for the purpose of this research. Content for the visual development will be gathered with the support of experts from the Global TraPs network. This visual system will be launched at Global TraPs and its effectiveness tested within this community.

Visualization is a powerful agent for addressing environmental issues, such as sustainable phosphorus. It enables greater learning capacity and enhances engagement with diverse audiences. This research is an opportunity to assess how visual tools can be effectively designed to complement transdisciplinary processes.

GLOBAL TraPs

TRANSDISCIPLINARY PROCESSES FOR SUSTAINABLE PHOSPHORUS MANAGEMENT

Contacts

To inquire about involvement in Global TraPs, please contact the Global TraPs management team:

- Science leader

  Roland W. Scholz, Tel. +41 44 632 58 91

  E-mail: roland.scholz@env.ethz.ch

- Practice leader

  Amit Roy, Tel. +1 256 381 6600

  E-mail: ARoy@ifdc.org

- Science manager

  Désirée Ruppen, Tel. +41 44 632 91 63

  E-mail: desiree.ruppen@env.ethz.ch

- Practice manager

  Debbie Hellums, Tel. +233 246 634 216

  E-mail: dhellums@ifdc.org

For updates about the Global TraPs effort, visit our website: **»» http://www.uns.ethz.ch/gt**

This newsletter has been produced by Sandro Bösch, Debbie Hellums, Amit Roy, Désirée Ruppen, and Roland W. Scholz.