DPRN PHASE II – REPORT NO. 18

Phosphorus Depletion – The invisible crisis

Netherlands Water Partnership

WASTE advisers on urban environment and development

PLANT RESEARCH INTERNATIONAL WAGENINGEN UR

Development Policy Review Network

Colophon

This document reports on the process 'Phosphorus Depletion: The Invisible Crisis' which was carried out within the framework of the Development Policy Review Network (DPRN) and organised by the Netherlands Water Partnership, WASTE and Plant Research International (Wageningen-UR). With a view to stimulating informed debate and discussion of issues related to the formulation and implementation of development policies, DPRN creates opportunities to promote an open exchange and dialogue between scientists, policymakers, development practitioners and the business sector in the Netherlands and Flanders. For more information see www.DPRN.nl and www.global-connections.nl

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Report on 'Phosphorus Depletion: The Invisible Crisis'

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Period: 1 February 2009 – 1 April 2010

Responsible organisations: The Netherlands Water Partnership, WASTE and Plant Research International – Wageningen UR

Introduction

This one year process, organised by the Netherlands Water Partnership (NWP), WASTE and Plant Research International of Wageningen University and Research Centre (PRI-WUR), on behalf of the Nutrient Flow Task Group (NFTG)[1], was initiated in order to try and place the issue of phosphorus depletion on the Dutch and European debate agendas and increase awareness of the problem by:

- Bringing actors from various sectors together in an overarching platform to reflect – from different perspectives – on the consequences of phosphorous depletion and possible mitigation options for avoiding major socio-economic eruptions due to food insecurity.
- Exchanging experiences achieved in supporting local policy development and the formulation/implementation of research and action projects.
- Contributing – based on new insights from the above – to the policy debate in the Netherlands and Belgium, and consequently Europe, to highlight the urgency of addressing this development and the need to integrate its findings in European as well as global agricultural policy and subsequently towards international cooperation.
- Encouraging universities, the private sector, local and national governments in the Netherlands and Belgium to develop scenarios as a result of the nutrient shortage.

Phosphate fertiliser is a prerequisite for economically viable agriculture since plants need phosphate to grow and produce seeds. However, demand for phosphate is increasing, while global reserves are finite. The general estimate is that known resources will last for 100 years. There are no alternatives for phosphate as a key component of fertilisers, hence the implications for global food production are enormous and may eventually result in large-scale famine. Phosphorous shortage is expected to further complicate competing claims for food, energy and land and this could well lead to social-political turmoil. Considering the magnitude of this problem and its far-reaching implications, it is hard to understand why phosphorus depletion is generally not on any political agenda.

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[1] The NFTG is a growing network of public parties, NGOs, the private sector, knowledge institutes and network organisations sharing a common concern for phosphorus depletion.

With a view to putting phosphorus depletion on the agenda the NFTG followed a – somewhat unusual – approach characterised by flexibility in order to respond to unforeseen developments and opportunities.

Background to the theme

The question being asked is whether it will be possible to feed a growing global population in the future? Often it is simply assumed that resources necessary for increased food production will be just as available as they are today. This might not be the case for phosphorus (P) which is a macronutrient for plant growth, irreplaceable and indispensable for growth.

In the pre-industrialised era, when there was a much lower global population, crop production (and food supply) relied on the natural supply of phosphorus in the soil, with or without additional supplies from organic manure. Human excreta were also used as input, especially in China, but also in parts of Europe. Increased food production, which was necessary to feed the growing global population, became possible from around 1850 based on the input of artificial fertilisers (nitrogen but also phosphorus) and boosted agriculture (and population growth) tremendously. In this way a system was created with a positive feedback, which led to the accelerated use of important resources such as phosphorus, and which allowed agriculture to produce more and more and without any dependency on organic manure.

Currently we are in a situation in which global food supply has become dependent on continual inputs of artificial phosphate fertiliser to maintain soil fertility and to compensate for offtake with the harvested crops. However, phosphate deposits are finite. The life of such resources is the subject of much discussion among scientists. They all estimate that economically exploitable reserves could be depleted by within 50-130 years. The problem of phosphorus depletion is further complicated by the fact that, similarly to fossil fuels, the control of phosphorus resources is in the hands of a limited number of countries. Most of the known reserves are in Morocco, the US and China. However, China recently imposed an export tariff on phosphate (Cordell, 2008).

In order to sustain a future for humankind it is obvious that we need to reduce losses to the ocean's sediment, develop sound and sustainable agricultural fertilisation strategies and recycle as much phosphorus from various sources which are currently not being tapped. However, there is a lack of general awareness of the problem and neither does the issue seem to feature on the agenda of major international organisations like FAO, WHO and UN. Awareness on the problem therefore needs to be increased.

Activities realised

Presentations at (inter)national fora

The NFTG members gave presentations on phosphorus depletion at several national and international fora between March and August 2009. These included the 5th World Water

Forum held in Istanbul in March 2009 and a seminar organised by the Dutch Ministry of Agriculture, Nature and Food Quality (LNV) during the World Water Week in Stockholm in August 2009. The issue was also raised at the 'Choose for Climate' debate in Wageningen and the International Conference on Nutrient Recovery from Wastewater Streams in Vancouver in May 2009.

On these occasions, a leaflet entitled 'Phosphorus Depletion: The Invisible Crisis' was presented and made available to interested parties.[2] The leaflet provides information on phosphorus scarcity and the NFTG. The subject was also brought to the attention of important actors such as the Food and Agriculture Organization of the United Nations (FAO), the International Fund for Agricultural Development (IFAD), the Dutch Ministry of Foreign Affairs, the Bill & Melinda Gates Foundation, Water for People, and many other organisations involved in water and sanitation issues in developing countries.

Article in The Broker

Through their DPRN contacts, the process organisers were able to publish an article entitled 'Peak phosphorus. The next inconvenient truth' in The Broker of 4 August 2009.[3] The article discusses the problem of phosphorous depletion and its geopolitical implications. The article is also intended to raise awareness in order to promote the recovery and reuse of phosphorus and other nutrients from organic waste and wastewater streams.

Policy note & mini-seminar in The Hague

With a view to reaching Dutch policymakers in particular, a mini-seminar on phosphorus depletion was organised in Nieuwspoort in The Hague on 7 October 2009 (for the Programme see Appendix 1 and for the list of participants see Appendix 2). The seminar was a joint effort with the Technology Assessment Steering Committee (TA), which was appointed by LNV to advise the Minister directly on important strategic issues that concern the ministry. In June 2009 a partnership was set up between the NFTG and the TA with a view to jointly addressing phosphorus depletion as a key issue. The mini-seminar followed the publication of a study, commissioned by the TA and carried out by PRI-WUR, with input from NFTG members, entitled 'Phosphorus in agriculture: global resources, trends and developments'.[4] Based on this report and input by the NFTG members, the TA presented a policy note and accompanying letter to Minister Verburg.[5] The mini-seminar was meant to underline the importance of this policy note.

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2 The leaflet can be found at: http://phosphorus.global-connections.nl/publications/factsheet.pdf. A leaflet with brief information on the NFTG and the issue of phosphorus depletion is also available at: http://phosphorus.global-connections.nl/publications/NFTG.pdf.

3 The article is available at: http://www.thebrokeronline.eu/en/articles/Peak-phosphorus.

4 The report written by Smit, A.L. *et al.* is available at: http://phosphorus.global-connections.nl/phosphorus-in-agriculture.pdf.

5 The policy note can be found at: http://www.stuurgroepta.nl/rapporten/beleidsnotitie_fosfaat.pdf; and the policy letter at: http://www.stuurgroepta.nl/rapporten/briefadviesfosfaat.pdf.

During the seminar Arno Rosemarin of the Stockholm Environmental Institute gave a teleconference presentation. After a few brief statements by, amongst others, the Dutch interdepartmental working Group on Scarcity and Transition and Senate member Prof. Dr Eric Smaling, Mr Marcel Lefferts, Director of 'Slibverwerking Noord-Brabant' gave a presentation on the activities the company is already undertaking to recover phosphate from sewage.

Paper

To give a further impulse to the seminar, the NTFG wrote a paper entitled, 'The emergent phosphorus shortage as a challenge' which included a proposal to set up a phosphorus bureau to coordinate joint learning by the different partners.[6] All the seminar participants received a draft version of the report beforehand. The working paper's overall conclusion on the need for coordinated learning was supported by the 41 participants, with the comment being made that such cooperation should take the form of a platform rather than a bureau and that it should also include other crucial nutrients. The seminar conclusions were recorded and sent to all participants.[7] These conclusions focused on the specific roles that the platform will have to fulfil and the necessity of a hosting function.

Mini-seminar in Brussels

Another key activity during the process was the organisation of a mini-seminar which was held in Brussels on 4 March 2010 (see Appendix 3 for the programme and Appendix 4 for the list of participants). The aim of the seminar was to ensure that the issue featured more prominently on the European debate agenda and it was organised in cooperation with Member of Parliament (MEP) Bas Eickhout of the European Greens party, and MEP Lena Ek of the European Alliance of Liberals and Democrats for Europe. 46 participants joined this seminar and these included several representatives from the European Parliament as well as from different DGs of the European Commission (Research, Environment, Enterprises).

Arno Rosemarin of the Stockholm Environmental Institute introduced the issue of phosphorus shortage in order to familiarise policymakers and politicians with the problem. The focus then switched to European policy and Linda Gårdstam of the Swedish Environmental Protection Agency explained the Swedish phosphorus recycling policy. Both introductions were followed by an intensive panel discussion with representatives from research, the private sector, NGOs and the TA steering committee.[8]

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6 The document can be found at: http://phosphorus.global-connections.nl/phosphorus-shortage-as-a-challenge.pdf.

7 The document can be found at: http://phosphorus.global-connections.nl/conclusions-of-mini-seminar.pdf.

8 For more information on the results and conclusions of this mini-seminar see Minutes Mini Seminar Phosphorus Shortage: European challenges: http://phosphorus.global-connections.nl/minutes-mini-seminar.pdf.

Scenario for Drama documentary & Short DVD including fact sheet for political parties

During the last few months of the process, the organisers produced an outline and strategy on how to bring the topic to the attention of a wider audience in the Netherlands and abroad through a drama documentary.[9]

In addition to this, and after the European mini-seminar, the idea of making a short movie (lasting a maximum of 10 minutes) was broached. This short movie would be accompanied by a short information fact sheet entitled *"Op = op. Is een fosfaat schaarste te voorkomen?"* ("Gone is gone, can phosphorus scarcity be prevented?"), which would be used to inform all Dutch political parties about the issue during the run-up to the national elections in June.[10]

Country case-study

Lastly, a study was written which briefly describes the implications of phosphorus depletion for the Netherlands, given that the Netherlands has a unique position in Europe as the only country with a phosphorus surplus.[11] This study was written by PRI-WUR and is going to be used when lobbying Dutch (political) stakeholders.

Results

The various process activities first of all led to increased awareness of the problem of phosphorus depletion among a broad audience. This is indicated by the fact that the urgency of the issue was picked up by the press (see Appendix 5 for various articles). Awareness was raised particularly because of the research by PRI-WUR and the accompanying policy note by the TA steering committee addressed to the Ministry of LNV, documents to which extra emphasis was given in the press release of 7 October. In addition to this, there was the article in The Broker and the Scherpenzeel Foundation in the Netherlands placed the issue of phosphorous depletion at the top of its list of 'forgotten stories'[12]

The mini-seminar in The Hague was an excellent vehicle for addressing the issue with several important political stakeholders and several ministries. As a result of this, structural relations developed between the NFTG and the Global Partnership on Nutrient Management – an initiative of Dutch and US Governments after the 17th Conference on Sustainable Development (CSD 17) – as well as with the Interdepartmental Project Scarcity & Transition which was participated in by DGIS, and the Ministries of LNV, Housing and Spatial Planning (VROM), Economic Affairs (EZ), and Transport, Public Works and Water Management (V&W).

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9 The scenario for the TV documentary can be found at http://phosphorus.global-connections.nl/publications/ScenarioTVdocumentary.pdf

10 The short movie can be found at http://www.youtube.com/watch?v=HqOfcUufyzQ

11 This document can be found at http://phosphorus.global-connections.nl/case-study-netherlands.pdf

12 See http://www.hetvergetenverhaal.nl/index.php?id=127&no_cache=1&tx_ttnews%5Btt_news%5D=362&tx_ttnews%5BbackPid%5D=123

During the seminar the NFTG members agreed on the formation of a Nutrient Platform to fulfil the following roles:

- To coordinate science, policy and business in order to ensure coherent activities;
- To engage in advocacy in order to build a consensus and encourage appropriate policy frameworks;
- To define research priorities for nutrients management;
- To develop an understanding of strategic developments;
- To ensure that sufficient budget is available to pursue different angles of inquiry.

The mini-seminar in Brussels was intended specifically to ensure that the issue would feature on the European political agenda. Contacts with MEP Bas Eickhout had already been made in May 2009 during the 'Choose for climate' debate in Wageningen. The process organisers have kept in touch regarding developments ever since and have shared their ideas on a joint European mini-seminar. As a result of the seminar, Bas Eickhout has offered to follow up the initiative by taking steps to ensure that the issue is placed further up the European agenda. Furthermore, as a result of the seminar several European organisations, including the Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH from Germany and several players from Austria, have expressed an interest in cooperating with the NFTG.

Content wise, an important conclusion of the meeting in Brussels was that, as regards mitigation options, the EU should look at the problem from at least two different levels. At a global level, the enormous geopolitical implications of this problem should be used to draw attention to the problem and to demand that policy be devised to make mining processes more efficient. At European level there are several relevant mitigation options: (i) Improving efficiency by precision farming, (ii) Recycling of P through waste (water) treatment, (iii) Renewing sanitation by separating different waste streams at the source, decentralised waste (water) solutions and eco sanitation in developing countries. MEP Bas EIckhout concluded that the content is complex, but not impossible. It is a matter of how the different pieces of the puzzle are put together. Getting the issue on the various agendas is probably the most difficult task. Parliament and some Member States like the Netherlands, Germany, Sweden and Austria should take the lead in this. The European Water Partnership could probably fulfil a role in mobilising some Member States. After that it would be important to identify policies that are already addressing the issue and to link the issue to existing policies and change these where necessary and possible.

Lastly, the documentary and the case study on the phosphorus situation in the Netherlands provide the process organisers with material for future lobbying activities, especially in the light of the imminent elections in June 2010. Another interesting outcome of the process is the fact that some of the NFTG members have applied successfully for a tender on Sustainable Use of Phosphorus that was issued by the European Directorate-General for the Environment.

Contribution to the DPRN objectives

Stimulating informed debate

In particular, the seminars organised in The Hague and Brussels ensured that several important political stakeholders were familiarised with the theme. The fact that NFTG is made up of so many different stakeholders that view the issue from various perspectives, and the fact that both seminars were organised with various other partners meant it was important to get policymakers and politicians involved. The research by PRI-WUR provided the scientific knowledge base for the discussions and the policy note of the TA Steering Committee, and the following press releases, ensured that the message was properly taken on board.

Involvement of relevant partners

This DPRN process allowed us to create alliances with important partners such as the TA Steering Committee and MEP Bas Eickhout of the European Greens party. The DPRN process provided the NFTG with the necessary resources to invest in these relationships and organise the mini-seminars in The Hague and Brussels together with these partners. Subsequently, the seminars were important stepping stones for ensuring the involvement of other important partners such as the Interdepartmental Project Scarcity & Transition and the Global Partnership on Nutrient Management, as well as important international and European stakeholders.

A total of 88 people participated in the mini-seminars (see Appendices 2 and 4). A total of 42 participants attended the mini-seminar in The Hague and these included researchers (38%), people from the business community (29%), policymakers (21%), practitioners (7%) and 2 people representing the media (categorised as 'other', 5%). The mini-seminar in Brussels was attended by 46 participants and these included policymakers (30%), researchers and people from the business community (both 26%) and practitioners (15%).

Relevance for policy and practice

As phosphorus depletion has an impact on so many different issues (such as food security, the energy debate and many others) the relevance to development policy and practice is clear. This is also demonstrated by the fact that the TA steering Committee decided to publish a policy note about the issue. Thanks especially to both the mini-seminars, but also the different articles and reports that were published, the organisers were able to address the importance of phosphorus in relation to all of these different issues. The fact that attention could be paid to the large geo-political implications of phosphorus depletion, especially at European level, was probably even more important.

Enhancing cooperation and synergy

There are several ways in which the DPRN process contributed to enhanced cooperation and synergy between different sectors. First of all, as mentioned before, by executing the process on behalf of the NFTG - a differentiated group of stakeholders - the organisers were taken more seriously. This meant that the individual members of the NFTG were able to address important issues together with policymakers and this would not have been possible

if they had acted as individual organisations. Via the proposed plans for a Nutrient Platform, this DPRN process has acted as a stepping stone on the way to a vicious cycle of change and learning between businesses, institutions and agencies with the aim being to reflect on ongoing research and identify key choices and opportunities for joint action that will facilitate a move towards a sustainable use of phosphorus.[13] This cycle will be described in more concrete terms in the follow-up activities (see below).

Cooperation and synergy were also enhanced through working together with MEP Bas van Eikhout and the TA Steering Committee and through involvement in the discussions of the Interdepartmental Project Scarcity & Transition and the Global Partnership on Nutrient Management. Furthermore, new European actors may align with the NFTG as a result of the process, and some of them even applied successfully for a tender on Sustainable Use of Phosphorus that was issued by the European Directorate-General for the Environment.

Reactions and evaluation

Unfortunately, we did not survey the participants' reactions during and after both events. As both mini-seminars were interactive, the participants' reactions have been brought forward in the conclusions and minutes of the mini-seminars.[14]

Reflection

As mentioned before, in order to place phosphorus depletion on the agenda the NFTG adopted a – somewhat unusual – approach characterised by flexibility in order to be able to respond to unforeseen developments and opportunities. On reflection, this process has been very successful in putting the issue on the agenda. While, at the beginning of the process, the organisers had to look hard for allies and opportunities to present their case, a year later awareness had greatly increased. The somewhat hesitant start led to a decision being taken to neutrally extend the process budget for three months to include the European mini-seminar. The flexible attitude of DPRN towards this unusual approach was crucial as regards turning this process into a success.

This DPRN process enables us to create alliances with important partners such as the TA Steering Committee and MEP Bas Eickhout of the European Greens party. In particular, the seminars organised with these partners in The Hague and Brussels enabled several important political stakeholders to be introduced to the theme. In addition, this DPRN process has been a stepping stone towards a virtual cycle of change and learning between businesses,

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[13] For more information on this see the paper on http://phosphorus.global-connections.nl/phosphorus-shortage-as-a-challenge.pdf.

[14] See "Conclusions mini-seminar phosphorus shortage 7 October – setting up a Nutrient Platform" at http://phosphorus.global-connections.nl/conclusions-of-mini-seminar.pdf and "Minutes Mini Seminar Phosphorus Shortage" at http://phosphorus.global-connections.nl/minutes-mini-seminar.pdf.

research, NGOs and governmental bodies since all of these groups were involved in the NFTG as well as in the mini-seminars that were organised.

Unlike most other DPRN processes, in which the Ministry of Foreign Affairs primarily represents the policy sector, there was considerable participation on the part of the Ministry of Agriculture, Nature and Fisheries and the Ministry of Housing, Spatial Planning and the Environment. This emphasises the need for a coherent approach to Phosphorus depletion.

This process also differs from other DPRN processes with regard to the participation of policymakers and the business sector, which were both well represented. Unlike other DPRN processes, the practitioners (representatives of development organisations and other NGOs) were much less represented.

As time went by the process website was used extensively both to publish process documents and to present other relevant scientific background information. This website proved helpful for lobbying activities as it enabled the NFTG to present background information to stakeholders. Something that was probably even more important was the fact that this website gave the NFTG a more formalised image, and as such more legitimacy in lobbying activities towards important stakeholders. The online communications platform that was developed on the website to enable the NFTG members to exchange information and have online discussions has not been used because there turned out to be no great need for this.

The way forward

1. The process is going to be followed up firstly by an assessment of how to transform the NFTG into a Dutch Nutrient Platform (in terms of necessity, objectives, funding, hosting/structure, agenda, aspiration level etc.). The NFTG members have asked the NWP to continue carrying out the secretarial duties of the Task Group for a bridging period of another six months (until mid 2010) in order to facilitate the transition from an informal task group to a(n) (institutionalised) platform. This bridging period will partly be financed by the NFTG members themselves. In addition, the NWP has applied for Partners for Water funding in order to finance part of it.

   In order to do this an external consultant is going to be hired to develop a strategic plan for a Nutrient Platform. First of all the strategic plan should present the objectives and scope of the platform supported by current and potential members of the platform. Secondly the plan will formulate the main tasks of the platform. This can be achieved by carrying out the following activities:

   a. Stakeholder analysis (within NFTG and with possible missing links);
   b. Formulation of an organisation model (or different scenarios);
   c. Formulation of a budget and a plan as to how to finance a Nutrient Platform.

   This platform will most probably continue the NFTG's work in close cooperation with important partners like the TA steering committee, MEP Bas Eickhout of the European Greens party, the Global Partnership on Nutrient Management (hosted by VROM) and the

Global Phosphorus Research Initiative, with whom alliances have been established during this DPRN process. Furthermore, several other organisations, including the Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH in Germany and several players from Austria have expressed an interest in cooperating with the NFTG.

2. Another important follow-up to this process is the successful application by two of the partners involved - PRI-WUR and the Stockholm Environmental Institute (SEI) - for a tender on Sustainable Use of Phosphorus that was issued by the European Directorate-General for the Environment in May 2009. This can be regarded as a spin-off of the DPRN process, which helped create the network needed for a successful combination of the expertise required to carry out this tender.

Appendix 1- Programme of the mini-seminar on 7 October in The Hague

Programme Mini-seminar Phosphorus Shortage - Nieuwspoort, The Hague

Date: 7 October, 15:45 - 17.30, Location: Nieuwspoort, Lange Poten 10, The Hague

14:30 - 15.30 Press meeting TA Steering Committee

15.30 - 15.45 Break

15.45 Start mini-seminar

15.45 - 15.50 Opening - Prof. Dr Ir. Wim Rulkens

15.50 - 15.55 Explanation NFTG and goals mini-seminar - Gert de Bruijne (WASTE)

15.55 - 16.05 Peak Phosphorus: challenges - Arno Rosemarin (Stockholm Environmental Institute)

16.05 - 16.10 Short Statement - Hannah Koutstaal (Interdepartmental Project Scarcity & Transition)

16.10 - 16.15 Short Statement - Prof. Dr ir. Eric Smaling (Prof. in Sustainable Agriculture ITC Enschede & WUR and Member of the Dutch Senate)

16.15 - 16.20 Short Statement - Harm Evert Waalkens (Member National Parliament - PVDA)

16.20 - 16.30 Phosphorus Recovery in practice - Marcel Lefferts (Director Slibverwerking Noord-Brabant)

16:30 - 17.30 Discussion: The emerging phosphorus shortage as a challenge - setting up the 'Nutrient Bureau'

17.30 Drinks

For directions to Nieuwspoort see: http://www.nieuwspoort.nl/nl_NL/Planning-Route/

Appendix 2 – List of participants in the mini-seminar on 7 October in The Hague

	Name	Surname	Email	Organisation	Sector
1.	Beukel, van den	Aart	aart.vandenbeukel@dhv.com	Safi Sana Holding	Business
2.	Bindraban	Prem	prem.bindraban@wur.nl	WUR	Science
3.	Bruijne, de	Gert	gdebruijne@waste.nl	WASTE	Practice
4.	Buitenweg	Jeroen	j.buitenweg@wrd.nl	Waterschap Regge en Dinkel	Policy
5.	Diphoorn	Luuk	l.diphoorn@nwp.nl	NWP	Practice
6.	Dokter	Henk	henk.dokter@reedbusiness.nl	Weekblad Boerderij	Other
7.	Eriksson	Caroline	??	Embassy of Sweden	Policy
8.	Hellings	Bart	g.p.j.hellings@minez.nl	Koploperloket Min EZ	Policy
9.	Hotlhuizen	Yolande	y.holthuijzen@louisbolk.nl	Louis Bolk Instituut	Science
10.	Jansen	Leo	jansenleo@hetnet.nl	Stuurgroep TA	Science
11.	Joost	Brouwer	brouwereac@orange.nl	Brouwer Envir. & Agric. Consultancy	Business
12.	Keet	Peter	p.j.m.keet@minlnv.nl	LNV	Policy
13.	Klitsie	Johan	johan.klitsie@minvrom.nl	VROM	Policy
14.	Korving	Leon	korving@snb.nl	NV Slibverwerking Noord-Brabant	Business

15.	Koutstaal	Hannah	h.koutstaal@minlnv.nl	LNV, Interdep. project Schaarste & Transitie	Policy
16.	Leeuw, de	Jan	??	LNV, programma duurzame voedselsystemen	Policy
17.	Lefferts	Marcel	lefferts@snb.nl	NV Slibverwerking Noord-Brabant	Business
18.	Lommen	Joost	joost.lommen@wur.nl	WUR	Science
19.	Marijn	Kunst	m.kunst@nwp.nl	Grontmij	Business
20.	Martin	Pelle	martinpelle@gmb.eu	GMB Watertechnologie	Business
21.	Mulleneers	Erik	e.a.j.mulleneers@minlnv.nl	LNV	Policy
22.	Nieuwlands	Jo	ja.nieuwlands@wze.nl	Waterschap Zeeuwse Eilanden	Policy
23.	Notenboom	Geert	geert.notenboom@grontmij.nl	Grontmij	Business
24.	Pannekoek	Ger	g.pannekoek@nwp.nl	NWP	Practice
25.	Roeveld	Paul	paul.roeleveld@nl.mwhglobal.com	MWH	Business
26.	Ronteltap	Mariska	m.ronteltap@unesco-ihe.org	unesco-ihe	Science
27.	Rookhuizen	Lies	lies.rookhuizen@xs4all.nl		Business
28.	Rosemarin	Arno	arno.rosemarin@sei.se	Stockholm Environmental Institute	Science
29.	Rougoor	Carin	crougoor@clm.nl	Stuurgroep TA	Science

30.	Rulkens	Wim	w.rulkens@chello.nl		Science
31.	Sattari	Sheida	sheida.sattari@wur.nl	WUR	Science
32.	Schoumans	Oscar	oscar.schoumans@wur.nl	WUR	Science
33.	Smaling	Eric	esmaling@tiscali.nl	ITC Enschede / WUR / SP	Science
34.	Smit	Bert	bert.smit@wur.nl	PRI	Science
35.	Someus	Edward	www.3ragrocarbon.coh	3r	Business
36.	Stef	Severt	stef.severt@reedbusiness.nl	Agrarisch Dagblad	Other
37.	Timmermans	Bart	b.timmermans@louisbolk.nl	Louis Bolk Instituut	Science
38.	Udo de Haes	Helias	udodehaes@cml.leidenuniv.nl	Stuurgroep TA	Science
39.	Veenhuizen, van	René	r.van.veenhuizen@etcnl..nl	ETC	Business
40.	Vergouwe	Lideke	lideke.vergouwen@grontmij.nl	Grontmij	Business
41.	Voortman	Roelf	r.l.voortman@sow.vu.nl	SOW-VU	Science
42.	Weijden, van der	Wouter	wvanderweijden@clm.nl	Stuurgroep TA	Science

Appendix 3 – Background paper for the mini-seminar on 7 October in The Hague

The emerging phosphorus shortage as a challenge - Setting up a Nutrient Bureau[15]

One year ago the Nutrient Flow Task Group (NFTG) was set up[16] to explore the need for action to address potential shortfalls in the supply of, for example, phosphorus. The recent report on this issue by Plant Research International (PRI) of Wageningen UR[17] was prepared in collaboration with the NFTG. Based on that report a Policy Paper was drafted by the Steering Committee Technology Assessment of Ministry of Agriculture, Nature & Food Quality to describe the economic and strategic implications of the emerging shortage and the need for a timely coordinated response to avoid a longer-term crisis.

Solving the challenges posed by this policy paper will require further research and changes in national and international policies. At the same time, it will also create new business opportunities for those who are willing to accept the challenge. In many cases these business opportunities will be part of a broader effort to improve agricultural practices, prevent erosion or improve sanitation infrastructures, in which phosphorus usage and recycling will become an increasingly important component. If we want to learn how to ensure the sustainable use of phosphorus we must build a learning cycle in which the results of business practices are studied. PRI's research paper is an example of that approach. The policy paper is a first step in a global lobby to ensure that the implications of the research are translated into clear choices on how to move forward: Are we willing to act now or later? What does this mean for regions like Europe, that do not have their own supplies? Policymakers will have to act on a range of issues. These will result in new business opportunities such as new incentives for recycling, ensuring local supplies, different agricultural practices, new recycling infrastructures and so on. The results need to be monitored continuously to ascertain whether the improvements are sufficient and whether some unexpected implications require additional attention.

Setting up the Nutrient Bureau

With a view to kick starting this vicious cycle of change and learning, the NFTG proposes the setting up of a Nutrient Bureau as a platform for businesses, institutions and agencies to reflect on ongoing research, identify key choices and opportunities for joint action that will facilitate a move towards a sustainable use of phosphorus.

This Nutrient Bureau should therefore ensure that:

- emerging opportunities are recognised and developed (project development);
- a strong interest network emerges (coordination);
- learning and cooperation among its partners is encouraged (broker);

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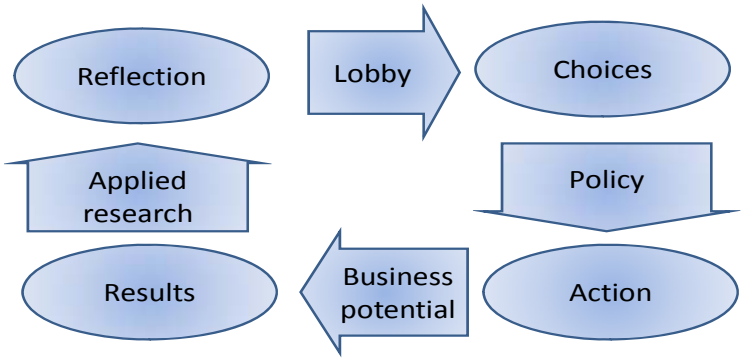
[15] Draft October 2009 – please note that this paper is a living document.

[16] With support from the Netherlands Water Partnership's WASH Secretariat.

[17] Phosphorus in agriculture: resources, trends and developments (A.L. Smit, e.a.), prepared for the Steering Committee Technology Assessment of the Ministry of Agriculture, Nature & Food Quality.

- research topics and policy gaps are identified and addressed.

Phosphorus – change as a learning cycle
A combination of complementary activities that is likely to be more successful if experiences are shared in the network:



The Nutrient Bureau will combine the forces of businesses like Thermphos, SNB and Grontmij, with knowledge institutions like Wageningen UR, WASTE and the responsible policymakers in departments responsible for agriculture, sustainable development, trade and development assistance.

The opportunities - which the Bureau seeks to address - are considerable given that 10-20% of world GDP depends on a reliable and affordable sources of phosphor. In particular, food production and the future availability of bio-feedstock for the chemical industry and new materials are directly impacted. On the other hand, the inappropriate use of phosphorus can reduce food production, encourage the erosion and pollution of waterways, cause coastal dead zones and impact fisheries.

A transition to more sustainable production methods, recycling and the more effective use of phosphorus will require new policies like the Swedish phosphorus recycling requirement. This means the restricted use of subsidies for fertilisers, new research and new business models in which phosphorus recovery becomes a major economic driver for new recovery methods, appropriate food production and appropriate infrastructures.

As the only phosphorus surplus country in Europe, the Netherlands is in a unique position and faces special challenges. Managing this phosphorus surplus is a key determinant for European limits on manure usage. The present cost of manure processing is more than 100 million euros. Phosphorus recovery requirements could significantly influence the competitiveness and design of biogas installations - a fast growing business in Holland, Germany, Denmark and other animal husbandry countries. Better defined and more effective composting and a wider range of recycling products can create alternatives for chemical fertiliser production and industry, assuming appropriate policy adaptations and effective organisational and value chains structures to deliver the benefits.

An emerging world class cluster can address these opportunities

The world class position of the Dutch agro cluster, our leading role in water, waste and sanitation management, and in the chemical industry, including fertiliser production and feedstock, as well as our ongoing efforts to address competing claims in complex multi-stakeholder settings, are critical to making the most of the emerging opportunities. These businesses are supported by strong knowledge networks of public and market focused institutions. If European and global agencies, policymakers and NGOs start playing a key role this will help shape more effective policies. Financial institutions can also play a critical role in making the most of these opportunities.

While NFTG partners are active in different arenas, they are convinced that cooperation is necessary to achieve a sustainable use of phosphor. We intend this mini seminar to help broaden and sustain the coalition and encourage others to become part of the solution for the global nutrient crisis. The idea is to maximise learning. We believe that change is most effectively driven by business initiatives driven by policy initiatives and incentives. These should be based on scientific, business and social/ecological research on the implications of the emerging opportunities.

Seminar objectives

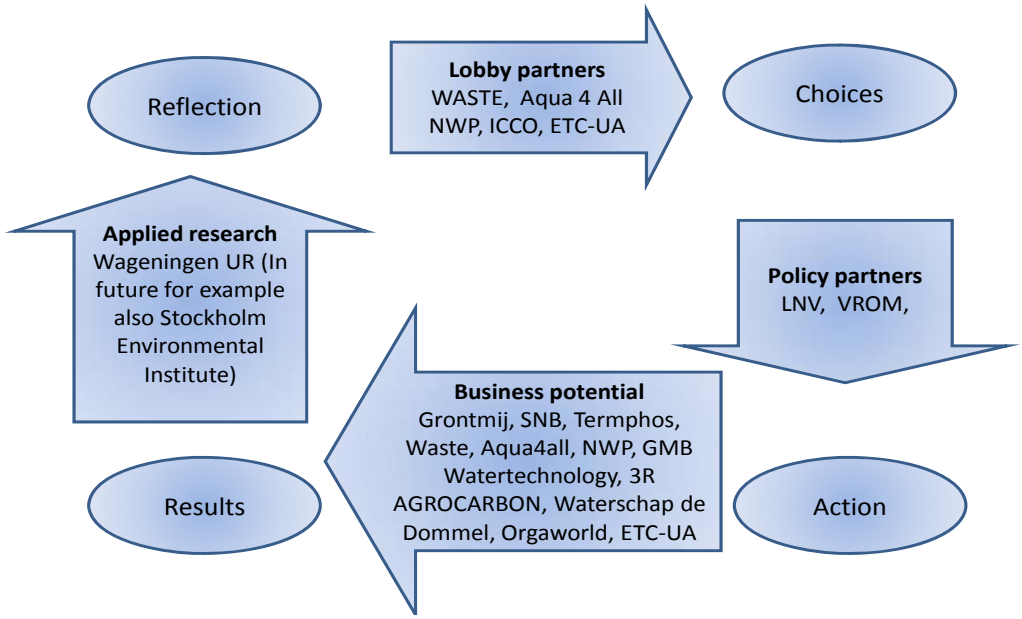
During the seminar we hope you will join us in a discussion of the above to establish where is action possible and needed. What should our priorities be? Who else should and could be involved? The lists provided are intended to stimulate discussion and help us identify better and more specific opportunities. What would help your institution most to get involved in this long-term effort? We also want to receive feedback from the participants on the future role and tasks of the Nutrient Bureau and additional partners.

The Technology Assessment (TA) Steering Committee is an independent advisory committee set up by the Dutch Ministry of Agriculture, Nature and Food Quality that aims to clarify societal issues that are related to scientific and technological developments within the scope of the Ministry. For more info see www.stuurgroepta.nl.

The Development Policy Review Network (DPRN) is a network of Dutch and Flemish development experts whose aim is to stimulate informed debate on development policies and enhance cooperation and synergy between scientists, policymakers, practitioners and entrepreneurs in the field of international cooperation. For more info see www.dprn.nl and www.global-connections.nl.

The Nutrient Flow Task Group (NFTG) is a Dutch initiative facilitated by the Development Policy Review Network (DPRN) that strives to accelerate the search for solutions for phosphorus depletion and its global impact. The NFTG is a broad network of public parties (the Ministries of LNV and VROM, Waterschap de Dommel), NGOs (WASTE, ETC-UA, ICCO), private sector (Grontmij, Thermphos, SNB, GMB-Watertechnology, Orgaworld, 3R AGROCARBON), knowledge institutions (Plant Research International, Alterra, Wageningen University) and network organisations (Netherlands Water Partnership, Aqua 4 All). For more info see http://phosphorus.global-connections.nl.

Present NFTG partners are linked in accelerating learning towards a sustainable use of Phosphorus.



Nutrient Flow Task Group contact info

Secretariat within the Netherlands Water Partnership (NWP)

Contact: Ger Pannekoek

Email: g.pannekoek@nwp.nl or phosphorus@global-connections.nl

Appendix 4 – Programme of the mini-seminar on 4 March in Brussels

The Greens | European Free Alliance in the European Parliament

Alliance of LIBERALS and DEMOCRATS for Europe

Invitation Mini Seminar Phosphorus Shortage: European challenges
European Parliament Brussels, A. Spinelli Building, Room 5E1
4 March 2010, 10.30 am – 14.00 pm

The threatening shortage of phosphorus – a key component of fertilisers – is crucial for the world's food supplies. Phosphorus is an essential nutrient for all plants and animals. It is also one of the three key components (together with nitrogen and potassium) of fertilisers, and therefore crucial for the world's food supply system. Phosphorus shortage will be one of the most pressing problems of the coming years. Global supply is limited and concentrated in just a few countries. Demand is increasing rapidly. Since there is not yet an alternative for phosphorus, innovative strategies are needed to ensure its availability. MEP Bas Eickhout, MEP Lena Ek and the Nutrient Flow Task Group (NFTG) intend this Mini Seminar to accelerate the search for solutions and help develop opportunities created by the phosphorus crisis.

Program

10.30 am Opening mini seminar, MEP Bas Eickhout (Greens/ EFA)
10.40 am Introduction on Phosphorous Shortage, Arno Rosemarin (Stockholm Environmental Institute)
11.10 am Short presentation on Swedish Phosphorous Recycling Policy, Linda Gårdstam (Swedish
EPA)
11.30 am Panel Discussion –Panel Members:

- Timothy Hall, DG Research, European Commission
- Arno Rosemarin, Stockholm Environmental Institute
- Willem Schipper, Thermphos International
- Arne Panesar, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)
- Helias Udo de Haes, TA Steering Committee

13.00 pm Conclusions, MEP Bas Eickhout (Greens/ EFA)
13.15 pm Lunch and informal discussions

Registration

Due to places being limited, please register by sending an email to:
bas.eickhout@europarl.europa.eu.

The Nutrient Flow Task Group (NFTG) is a Dutch initiative facilitated by the Development Policy Review Network (DPRN) that strives to accelerate the search for solutions for phosphorus depletion and its global impact. The NFTG is a broad network of public parties (the Ministries of Agriculture and Spatial Planning, Water Authority de Dommel), NGOs (WASTE, ETC-RUAF, ICCO), private sector (Grontmij, Thermphos, SNB, GMB-Watertechnology, Royal Haskoning, Tebodin, Orgaworld 3R-Agrocarbon), knowledge institutions (Plant Research International, Alterra, Wageningen University, Unesco-IHE) and network organisations (Netherlands Water Partnership, Aqua for All). For more info see http://phosphorus.global-connections.nl.

The Development Policy Review Network (DPRN) is a network of Dutch and Flemish development experts whose aim is to stimulate informed debate on development policies and enhance cooperation and synergy between scientists, policymakers, practitioners and entrepreneurs in the field of international cooperation. For more info see www.dprn.nl and www.global-connections.nl.

http://phosphorus.global-connections.nl | phosphorus@global-connections.nl

Appendix 5 – List of participants in the mini-seminar on 4 March in Brussels

	Name	Surname	Organisation	Sector
1.	Adam	Christian	Researcher	Science
2.	Arsenis	Kriton	Member of European Parliament, Progressive Alliance of Socialists and Democrats	Policy
3.	Beeks	Toon	Van Gansewinkel Groep	Business
4.	Bernard	Otim	Unknown	Other
5.	Beukel, van den	Aart	Safisana	Business
6.	Blauw	Nienke	GroenLinks	Policy
7.	Bruijne, de	Gert	WASTE	Practice
8.	Christensen	Henriette	Pesticide Action Network Europe	Practice
9.	Dewaele	Carl	Nuresys	Business
10.	Dijk, van	Kimo	Student WUR	Science
11.	Diphoorn	Luuk	AKVO	Practice
12.	Eickhout	Bas	Member of European Parliament, Greens/European Free Alliance	Policy
13.	Engelen, van	Vincent	ISRIC – World Soil Information	Science

14.	Ernes	Sjef	Aqua for all	Practice
15.	Gardstam	Linda	Swedish Environmental Protection Agency	Policy
16.	Gcerniglia	Giorgio	FEAD, European Federation of Waste management and environmental Services	Policy
17.	Gell	Kealan	Wageningen University	Science
18.	Hall	Timothy	European Commission, DG Research	Policy
19.	Haren, van	Rob	Kiemkracht	Practice
20.	Hermann	Ludwig	ASH DEC Umwelt AG	Business
21.	Hilton	Julian	Aleff Group	Business
22.	Janssen	Lies	NWP	Practice
23.	Korving	Leon	SNB Slibverwerking Noord-Brabant	Business
24.	Krabbe	Christian	Umweltsbundeambt	Policy
25.	Leida	Sergo	European parliament	Policy
26.	Lommen	Joost	Wageningen University	Science
27.	Luttik	Peter	AMNED consultancy	Business

28.	Meeûs, de	Cedric	Veolia Environment Europe Service	Business
29.	Mercuriadi	Christina	European parliament	Policy
30.	Moerman	Wim	Waste water technology expert	Science
31.	Nooteboom	Ariane	European parliament	Policy
32.	Notenboom	Geert	Grontmij	Business
33.	Panesar	Arne	GTZ	Policy
34.	Pannekoek	Ger	NWP	Practice
35.	Paulsen	Marit	Member of European Parliament, Alliance of Liberals and Democrats for Europe	Policy
36.	Pinkers	Mathieu	Ministry of LNV	Policy
37.	Pradt	Dietrich	Industrieverband Agrar e.v. (IAE)	Business
38.	Romanowicz	Agnieszka	European Commission, DG Environment	Policy
39.	Rosemarin	Arno	Stockholm Environmental Institute	Science
40.	Rudek	Reiner	Karlsruher Institut fur Technologie	Science
41.	Schipper	Willem	Thermphos International	Business

42.	Schröder	Jaap	Wageningen University	Science
43.	Siegmund	Timo	EPEA internationale Umweltforschung GmbH	Business
44.	Smit	Bert	Plant Research International (WUR)	Science
45.	Strobbe	Marc	R&D Manager Inorganics & Chlor-Alkali	Science
46.	Udo de Haes	Helias	TA Steering Group	Science

Appendix 6 –Phosphorus depletion in the press

- Tekort aan fosfaat groot voedselprobleem. *De Financiële Telegraaf, 7 October 2009.* http://www.telegraaf.nl/dft/nieuws_dft/5018171/__Tekort_aan_fosfaat_groot_voedselprobleem__.html?p=16,2)
- Tekort aan fosfaat dreigt. *Agrarisch Dagblad,* 8 October 2009.
- 'Voedselzekerheid is ook bij ons in Europa een illusie'. *Agrarisch Dagblad*, 9 October 2009.
- Essentiële grondstof kunstmest raakt op. *NRC Handelsblad*, 16 October 2009. http://www.nrc.nl/economie/article2388573.ece/Essentiele_grondstof_kunstmest_raakt_op
- Fosfaatschaarste bedreigt voedselproductie. *NRC Handelsblad,* 16 October 2009.
- Teleac [Radio interview], 6 November 2009. http://www.teleac.nl/radio/index.jsp?site=site_radio&category=1683626&nr=1115435&item=2623127#
- Voorraad fosfaat raakt op. *Nederlands Dagblad*, 13 November 2009. http://www.nd.nl/artikelen/2009/oktober/07/tekort-aan-fosfaat-groot-voedselprobleem
- Fosfaat terug op de hoop. *Chemisch Dagblad C2W*, 14 November 2009. http://www.fosfaatrecycling.nl/files/Chemie_actueel.pdf
- Poepen en plassen tegen de fosfaatcrisis. *Duurzaamnieuws.nl*, 15 November 2009. http://www.duurzaamnieuws.nl/bericht.rxml?id=54639&title=Poepen%20en%20plassen%20tegen%20de%20fosforcrisis

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