

With this newsletter LeAF (Lettinga Associates Foundation) aims at informing you on its projects, courses and other activities in the field of new sanitation, anaerobic technology and other sustainable technologies aiming at recovery of valuable resources.

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Dear readers,

Last year LeAF has given extra attention to reflection and development. In the light of the economic situation on both the Dutch and the world market, the changes within the Dutch policy considering international development and changes within our own team, we carefully considered our ambitions, focus areas and ways of working. This process resulted in a number of actions that should lead to a better positioning of LeAF.

Part of these actions have already been put into practice. This resulted amongst others in a number of new clients and partners. Another change is related to our style. After 15 years we considered it time to restyle our logo into a more modern version. In addition we decided to distribute our LeAF Letter in two languages; the English version (which you are reading now) remains known as the LeAF Letter, the Dutch version is called LeAF Nieuwsbrief. The content of both newsletters is partly the same, partly specific for the situation in the Netherlands or abroad. It is of course possible to receive the Dutch version instead of, or in addition to, the English version if you prefer this. In the process of updating our website, we will further change the layout of this LeAF Letter. We hope to launch our new website within two months. In the coming LeAF Letter you can read more about this.

For now I wish you inspiration while reading this LeAF Letter and of course, on behalf of all co-workers and the board of LeAF, all the best for 2013.

Marjo Lexmond
Managing director

Updates LeAF laboratory

A lot has changed in the LeAF laboratory after moving to the Technotron building of Wageningen University together with the sub-department of Environmental Technology early 2011. New facilities became available and this enabled us to set up new tests. LeAF nowadays has permanent access to a cabin in the Modutech facility (Modular Biobased and Environmental Sciences and Technology Facility). The cabin can be used for (long-term) research on anaerobic and/or aerobic treatment of biomass or waste streams with custom-made reactors and CSTR systems, enabling us to accommodate clients in almost any case. The continuous systems may be operated at mesophilic or thermophilic conditions.

There is a pipeline from the sewage treatment plant in the nearby village of Bennekom providing real domestic wastewater if necessary. Since vacuum toilets, no mix toilets and water free urinals have been installed at the department of Environmental Technology it is also possible to work with real source separated human waste streams.

Besides, LeAF has its own lab which is equipped with (rotary shaking) incubators for BMP and other incubation tests and set-ups for special short-term experiments, such as pH and temperature controlled formation of struvite in waste streams like manure, (digested) sludge or rejection water or other physicochemical processes. LeAF shares its lab with the microbiology lab of



Environmental Technology with an anaerobic hood, two microscopes (one stereo) equipped with a digital camera and connected to a computer for imaging analysis, and equipment to flush headspaces and to create specific headspace compositions in batch tests.



In addition, LeAF can make use of other excellent laboratory facilities of Environmental Technology including a wet chemical laboratory, a stove and oven facility, the instrumental laboratory (GC, LC, LC-MS), a metal laboratory



equipped with an ICP-OES and an AAS system for analysing metals. Recently an XRD was installed which may assist us in research e.g. to analyse the composition of inorganic materials like struvite or for TGC analysis.

The certified service laboratory of Environmental Technology offers the possibility to perform analyses upon request. LeAF is cooperating with this laboratory for e.g. COD, N, and P analysis or for the assessment of biogas composition (CH_4 , CO_2 , N_2O and others).

Clearly, LeAF is ready for the new challenges that coincide with the transition to the biobased economy and recovery of nutrients from (treated) wastewater, manure and biomass. Of course we will continue to carry out the laboratory studies to test the treatability of wastewaters, digestibility of specific waste streams like manure or biomass, activity of sludges, toxicity assays and biodegradability of specific compounds. Since laboratory testing is one of our specialities we think along with the client to come up with the best (tailor made) laboratory set up to obtain high quality results in the future.

For more information, please contact Miriam van Eekert (miriam.vaneekert@wur.nl).

Innovative nitrogen recovery

Recovery and reuse of nutrients such as nitrogen, phosphate and potassium, which are essential for intensive agriculture, receives more and more attention. Closing the phosphate cycle already receives a lot of attention. Possibly because of the depletion of the phosphorus reserves and the restricted number of regions where these reserves are located. There is no certainty that the supply by these countries is guaranteed in the future.

Free nitrogen (N_2) is abundantly present in the atmosphere. However, it costs energy to produce a nitrogen-containing fertilizer (mainly ammoniumsalts) out of it. After the uptake of ammonium by the crops, via our food consumption part of it ends up at the wastewater treatment plants. Elimination of ammonium from the wastewater again costs energy. Therefore, attention is needed for nitrogen recovery.

By recovering ammonium in useful products and directly or indirectly utilize it as a fertilizer, the nitrogen cycle becomes less loaded resulting in less energy consumption, less eutrophication, and less N_2O emissions. At present, the recovery of nitrogen from liquids is done on a very limited scale. The available technologies require (too) much energy. Moreover, the products for the market are not yet optimally applicable, and in the Netherlands there is a hindering legislation on the reuse of nutrients recovered from human waste.

STOWA (Foundation for Applied Water Research) asked LeAF, together with Tauw and the Animal Sciences Group of WUR, to investigate the possibilities for tackling the above mentioned

bottlenecks. For this purpose, an inventory of nitrogen-rich streams in wastewater treatment plants was made, new techniques to recover nitrogen were investigated and possibilities were explored to apply the recovered nitrogen in agriculture.



Struvite precipitates from different processes

The report on this study will soon be published by STOWA (in Dutch). After publication, it can be downloaded from the STOWA site (www.stowa.nl) or you can contact us for sending you a copy of the report as soon as it is published.

For more information, please contact Jan Weijma (jan.weijma@wur.nl)

ROSSA project in Ethiopia started

With the kick-off meeting at the beginning of this month, the ROSSA (Resource Oriented Sanitation Services in Adama) project has officially started. The aim of the project is to increase the sanitary facilities for the poor households in Adama, Ethiopia. This will be done by strengthening the whole sanitation chain: from collection (toilets) of waste to the production of reusable products for agriculture. Increasing the capacities of the local authorities (on municipal and district level), but also those from health extension workers, constructors and local companies plays an important role. Moreover, attention is given for developing an environment (concerning the social, economic and institutional infrastructure) that allows a good functioning of every part of the sanitation chain. A locally justified collection and treatment concept will be implemented with local partners.

The improvement of the sanitary facilities (such as toilets) for poor households at a large scale will initially be done by putting effort in creating a local financial system in where the high and middle income households (partly) could subsidise the facilities for the poor households. Microcredits from banks and money from the local authorities can also play a role, as well as the proceeds of facilities on public places (such as markets, schools and bus stations) and the marketing of nutrient rich products for agriculture. Through setting-up a public-private cooperation in where all parties benefit from a well-functioning chain, the project functions as a kick-starter. The focus of the ROSSA project is on a number of areas in different residential districts. After completion of



Adama, Ethiopia: focus area ROSSA (Dec. '12)



Example pit latrine in Adama, Ethiopia (Dec. '12)

the project it is the task of the local community to upscale this concept for the whole city. The ROSSA project is led by waterboard Hollandse Delta and financed by the NWB fund and Aqua4all. Besides LeAF, WASTE, the waterboards Zuiderzeeland and Hunze en Aa's, and UNESCO-IHE are the Dutch partners in the project.

For more information please contact Katarzyna Kujawa (katarzyna.kujawa@wur.nl)

VIVACE in Latin America completed



End of August this year the EU FP7-Environment project "Vital and viable services for natural resource management in Latin America (VIVACE)" was finished. The project focussed on management of water, wastewater and organic

waste in the peri-urban areas in Latin America. Participants in the project were BOKU and CEMDS from Austria, IMTA from Mexico, INA and IIED-AL from Argentina, and LeAF.

Urbanisation is an on-going process in Latin America, and the increasingly large cities struggle to provide adequate services for water, wastewater and solid waste management. The conventional approach of continuously expanding the existing centralised services to all new planned and unplanned areas is still most common. However, this practice is becoming more and more difficult and cannot always deliver the desired results. There is a need to explore the possibilities of new and decentralised concepts,

not only directed at solving the problems with regard to water and sanitation, but also for finding opportunities for resources recovery and reuse. Because of their location between urban and rural zones, peri-urban areas are especially interesting in this respect. VIVACE explored the potential of those concepts in peri-urban areas in Xochimilco in Mexico City and Delta Tigre in Buenos Aires.

After studying the existing situation and challenges with respect to water, wastewater and solid waste management in the areas, local stakeholders were involved in a participatory approach to develop different scenarios and explore different technology options. After determining the technical feasibility of decentralised and centralised systems that fit the scenarios, the environmental, economic and social impacts were identified in an integrated assessment. Results were presented to stakeholders and policy makers, to discuss the implications on existing policies and to elaborate policy recommendations.

Alternative concepts that aim at maximisation of resource conservation are beneficial to the environment and not necessarily more expensive than the conventional centralised approach. Decentralised solutions require users to be more involved with and have more responsibilities with respect to their services, and work in focus groups has shown that people could be prepared to do that. However, users prefer centralised systems, and therefore there is a risk that for the longer term people do not want to have that involvement and responsibility. Furthermore, alternative approaches are less compatible with the existing institutional system. In order to make the implementation of decentralised solutions successful, capacity building would be needed, and the institutional framework should be prepared to support them instead of impeding them. Pilot projects could be useful to trigger social learning processes, with the objective of facilitating the transition from the existing situation to more resource friendly alternatives in peri-urban areas.

For more information about the project and an overview of its participants please visit the project website: www.project-vivace.net or contact Iemke Bisschops (iemke.bisschops@wur.nl).

Update MAI-TAI project in Asia



From March 2007 until February 2012 LeAF participated in the EU FP6 INCO project MAI-TAI ("Managing water scarcity: Intelligent tools and cooperative strategies"). MAI-TAI focused on integrated

water resources management in arid and semi-arid areas in Asia, specifically in China and India, aiming at developing a coherent set of innovative, relevant and cooperative policy options and management strategies to contribute to improving the existing situation. To achieve this improvement innovative concepts for water management



were required, which also take into account traditional, indigenous ways of water management. Case study areas for the project were two river basins: the Yongding river basin in China, which is a part of the larger Hai river basin, and the Bandi river basin in Rajasthan in India. The University of Natural Resources and Applied Life Sciences in Vienna, Austria had the project coordination, LeAF was leader of the work package on state of the art technologies and practises. Other participants included two other European, two Indian and four Chinese organisations.

For more information about the project and an overview of its participants please visit the project website: www.project-mai-tai.net or contact lemke Bisschops (lemke.bisschops@wur.nl).

LeAF workshop “Current issues in wastewater management” held in Wageningen

Stimulate knowledge exchange and capacity building are part of the aims of LeAF. In September 2012 LeAF organized in this context a tailor-made workshop for a delegation of PhD-students and scientific staff from ARDHI University, Dar es Salaam, Tanzania.

Advances in anaerobic wastewater treatment, recovery of nutrients, urban water management, laboratory testing – were just some of the topics covered by the workshop. The programme included field visits to municipal and industrial wastewater treatment facilities, a solid waste treatment company and presentations by research groups from Wageningen University. Also attending two symposia dealing with water technologies and environmental sciences was part of the programme. Overall, the workshop led to vibrant discussions on the current practices in wastewater management in the Netherlands and Tanzania and the differences and challenges in the selection and implementation of wastewater treatment technologies. One of the workshop participants noted during the workshop evaluation: “I learned a lot of what is actually practiced in a real life”.

LeAF hopes to continue cooperation with ARDHI University through future initiatives.



Field visit to waste(water)treatment facility during LeAF workshop.

For more information, please contact Darja Kragić (darja.kragic@wur.nl)

Lettinga Award 2013 – Call for proposals (preannouncement) Innovations in anaerobic technology

The Lettinga Award was initiated in 2011 by three Dutch environmental technology suppliers (Paques B.V., Haskoning and Biothane Systems) to stimulate the development of anaerobic treatment technology. Now, over 10 years later, anaerobic technology is considered a mature technology. Innovation remains desired to increase the applicability of the technology further. In addition to the use of anaerobic process within the treatment technology, the Biobased Economy results in more and more attentions to the anaerobic processes (including hydrolysis, acetogenesis and fermentation) for the production of other valuable components from used streams.

Reasons enough for a new Lettinga Award. As soon as the exact focus of this fifth Lettinga Award and the final list of sponsors is known, it is possible will follow soon. At the moment we want to inform you on the fact that the call is about to be launched. Important dates are:

May 1st, 2013: Deadline for application
June 1st, 2013: Judgement by the jury
June 25-28, 2013: Presentation during the AD 13 in Santiago de Compostela, Spain.

For more information, please contact Darja Kragić (darja.kragic@wur.nl) and check www.leaf-water.org.

Colophon

LeAF (Lettinga Associates Foundation) is an independent knowledge centre working on the development and implementation of sustainable environmental protection technologies with the aim of (re-) utilisation of valuable compounds in waste and wastewater and the improvement of the quality of life of people all around the world.

This LeAF Letter is distributed amongst its clients, relations, and others interested in environmental technologies for waste and wastewater treatment.

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