JOINT EVENT

4th International Conference on

Pollution Control & Sustainable Environment

&

6th Edition of International Conference on

Water Pollution & Sewage Management

July 26-27, 2018 Rome, Italy

Keynote Forum

Day 1

Pollution Control 2018 & Water Pollution 2018

4th International Conference on **Pollution Control & Sustainable Environment**

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Linda Grinberga

Latvia University of Agriculture, Latvia

Ainis Lagzdins

Latvia University of Agriculture, Latvia

Storm water treatment in a subsurface constructed wetland in a farmyard in Latvia

The water treatment system examined in this study consists of a sedimentation pond as a pre-treatment plant, a water pump and a horizontal subsurface flow constructed wetland with the surface area of 160 m^2. This treatment system was installed at the farm Mezaciruli, Zalenieki County, Jelgava region, in the middle part of Latvia, in August 2014 to improve storm water quality collected from the farmyard and demonstrate applicability of constructed wetland as a suitable treatment option for contaminated surface runoff. During the observation period of 32 months (2014-2017) water quality parameters such as total suspended solids (TSS), nitrate - nitrogen (NO_3-N), ammonium - nitrogen (NH_4-N), total nitrogen (TN), orthophosphate - phosphorus (PO_4-P), and total phosphorus (TP) were monitored and nutrient removal efficiency of the system was calculated. Nutrient concentrations in water samples collected at the inlet and outlet were compared. The monitoring results obtained during this study showed that on average concentrations of TN and TP were reduced by 34% and 82%, respectively. Overall, the subsurface flow constructed wetland displayed a steady decrease for all measured water quality parameters when average monthly nutrient retention values were compared. However, in some cases, an increase in the amount of nutrients leaving the constructed wetland was observed. The wetland retained suspended solids on average by 59% and similarity as for nutrients showed occasional increase in concentration during the non-vegetation period (October to March). This study illustrated that subsurface flow constructed wetland has a potential to reduce nitrogen and phosphorus concentrations in storm water.

Recent Publications

1. Grinberga L., Lagzdins A. (2017) Nutrient removal by subsurface flow constructed wetland in the farm Mezaciruli. Research for Rural Development 2017: Annual 23rd International Scientific Conference Proceedings, Vol. 1, p. 160 – 165.
2. Sudars R., Berzina L., Grinberga L. (2016) Analysis of agricultural run-off monitoring program results for estimation of nitrous oxide indirect emissions in Latvia. In: Proceedings of the 15th International scientific conference "Engineering for rural development". Jelgava, Latvia, Latvia University of Agriculture. Faculty of Engineering. Vol.15, p. 1030-1035 URL: https://www.scopus.com/inward/record.uri?eid=2-s2.0-
3. Lagzdiņš A, Jansons V, Sudārs R, Grinberga L, Veinbergs A and Abramenko K (2015) Nutrient losses from subsurface drainage systems in Latvia. Acta Agriculturae Scandinavica, Section B - Plant Soil Science 65:66–79.

Biography

Linda Grinberga is a PhD student in Latvia University of Agriculture. She is a Departmental International Coordinator at the Faculty of Environment and Civil Engineering. She is a Lecturer and Researcher at the Department of Environmental Engineering and Water Management. She has participated in nine scientific projects.

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Xiao Zhang

Chinese Academy of Meteorological Sciences, China

Climate warming, worsening local meteorological conditions, more aerosol pollution and aerosol induced vicious cycle to the explosive increase of $PM_{2.5}$ event in Beijing

Is there any connection between climate warming and local aerosol pollution? What is the mechanism of linkage? If climate warming has an impact on local meteorological conditions, how can the specific local meteorological elements, which most closely related to aerosol pollution, be extracted to quantitatively recognize two-way feedback between increase in aerosol pollution and unfavorable meteorological conditions? These have always been matters of special concern in the air pollution research. Here, we analyze long-term variations of an integrated pollution-linked meteorological index (which is approximately and linearly related to aerosol pollution), the extent of changes in vertical temperature differences in the boundary layer (BL) in Beijing and its vicinity (BIV), and northerly surface winds from Lake Baikal during wintertime to evaluate the potential contribution of climate warming to changes in meteorological conditions directly related to local aerosol pollution in this area; this is accomplished using NCEP reanalysis data, surface observations, and long-term vertical balloon sounding observations since 1960. The weather conditions affecting BIV aerosol pollution are found to have worsened since the 1960s as a whole. This worsening is more significant after 2010, with $PM_{2.5}$ reaching unprecedented high levels in many cities in China, particularly in BIV. The decadal worsening of meteorological conditions in BIV can partly be attributed to climate warming, which is defined by more warming in the higher layers of the BL than the lower layers. This worsening can also be influenced by the accumulation of aerosol pollution, to a certain extent (particularly after 2010), because the increase in aerosol pollution from the ground leads to surface cooling by aerosol–radiation interactions, which facilitates temperature inversions, increases moisture accumulations, and results in the extra deterioration of meteorological conditions. This phenomenon of high aerosol pollution that have a certain degree of influence on the vertical structure of BL is also observed in most of explosive increase of $PM_{2.5}$ events in BIV during winter of 2013-2017. An explosive event is defined when the $PM_{2.5}$ concentrations at least doubles within several or 10 h. The root causes of the explosive event are characterized in this studies (onset by transport of aerosol pollution from the south, then radiative cooling by the accumulated aerosol layer that enhances low-level temperature inversion, then the further reduction of turbulence intensity and the height of BL to one-third of the original, then an explosive increase of $PM_{2.5}$ mass event occurred). The feedback effect of BL meteorological factors was estimated to contribute >70% of such explosive increase in $PM_{2.5}$ mass. In summary, an important feedback loop is found for climate warming–unfavorable local and regional weather conditions–forming and accumulating aerosol pollution–further intensifying unfavorable weather conditions–more aerosol pollution and associated explosive increase of $PM_{2.5}$.

Biography

Xiao Zhang has completed his PhD from Nanjing University of China. He is the former Vice President of Chinese Academy of Meteorological Sciences, a former Director of Centre for Atmosphere Watch and Services, CMA. He has published more than 300 papers in reputed journals with h-index 57 and has been serving as an Associated Editor of Atmospheric Research and Editorial Board Member of *Tellus B: Chemical and Physical Meteorology.*

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Eduard Rott

University of Stuttgart, Germany

Tobias Reinhardt, Stephan Wasielewski and **Ralf Minke**

University of Stuttgart, Germany

Organophosphonates: Environmental problems related to them and possible solutions for their elimination from industrial wastewater

Organophosphonates - mainly PBTC, HEDP, NTMP, EDTMP and DTPMP - are increasingly gaining attention of environmental authorities and scientists. These compounds are used in a wide range of industrial and household applications due to their excellent complexing properties. Organophosphonates are associated with various environmental issues. For example, phosphate, which has an eutrophication effect on water bodies, can be formed by their abiotic degradation. In addition, they are associated with heavy metal remobilization in waters, make it more difficult to comply with strict P discharge targets in wastewater treatment plants (WWTPs), and in individual cases interfere with the operation of WWTPs due to complex formation. It is estimated that in 2012, with a consumption of 49,000 t/a in Europe, organophosphonates were discharged at 9000–18,600 t/a into European waters via inadequately purified industrial wastewater and municipal WWTPs. The elimination of organophosphonates specifically from industrial wastewaters is therefore strongly recommended. Wastewater contaminated with organophosphonates can be roughly divided into two categories. On the one hand, there are concentrates, e.g. from membrane filtration and cooling water treatment, where phosphonates are used as antiscalants and hardness stabilizers. On the other hand, there are mainly organically contaminated wastewaters containing phosphonates from industrial cleaning agents or, e.g., from paper and textile industries, where phosphonates are used as bleach stabilizers. This wide variety of possible wastewater matrixes requires different approaches in terms of the objective to eliminate organophosphonates from industrial wastewater. The presentation will compare different wastewater treatment processes (precipitation/flocculation with Fe^{III} or $Ca(OH)_2$, (photo-)Fenton, UV/Fe^{II}, filtration) and will present the effects of the wastewater matrix on these processes. For example, the presence of Ca^{II} promotes the adsorption of phosphonates on iron hydroxides. Furthermore, organophosphonates can impede the precipitation of iron hydroxides due to their complexing properties.

Recent Publications

1. Rott E, Steinmetz H and Metzger J W (2018) Organophosphonates: A review on environmental relevance, biodegradability and removal in wastewater treatment plants. Science of the Total Environment 615:1176-1191.
2. Rott E, Minke R, Bali U and Steinmetz H (2017) Removal of phosphonates from industrial wastewater with UV/FeII, Fenton and UV/Fenton treatment. Water Research 122:345-354.
3. Rott E, Minke R and Steinmetz H (2017) Removal of phosphorus from phosphonate-loaded industrial wastewaters via precipitation/flocculation. Journal of Water Process Engineering 17:188-196.

Biography

Eduard Rott has completed his PhD in the field of Environmental Engineering at University of Stuttgart, Germany. He is working as a Postdoctoral Scientist in the Institute for Sanitary Engineering, Water Quality and Solid Waste Management at University of Stuttgart, Germany.

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