Dangerous Pollutants (Xenobiotics) in Urban Water Cycle
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Dangerous Pollutants (Xenobiotics) in Urban Water Cycle

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Published in cooperation with NATO Public Diplomacy Division
Proceedings of the NATO Advanced Research Workshop on
Dangerous Pollutants (Xenobiotics) in Urban Water Cycle
Lednice, Czech Republic
3–6 May 2007

A C.I.P. Catalogue record for this book is available from the Library of Congress.

ISBN 978-1-4020-6800-3 (HB)

Published by Springer,
P.O. Box 17, 3300 AA Dordrecht, The Netherlands.

www.springer.com

Printed on acid-free paper

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PREFACE

Growing population and rising standards of living exert stress on water supply and the quality of drinking water. Some of these pressures can be reduced by demand management and water and wastewater reuse. In wastewater management, new challenges are caused by new chemicals of concern, including endocrine disrupters, pharmaceuticals, hormones, and personal care products, which often pass through wastewater treatment plants unabated, but may cause serious impacts on receiving aquatic ecosystems.

The topics focused on evaluation of impact of xenobiotics in the whole Urban Water Cycle are an interdisciplinary task which has a rising concern these days. Xenobiotics includes both inorganic elements like heavy metals, metalloids and man-made organic compounds such as pesticides, surfactants, solvents, fragrances, flavours, and pharmaceuticals as well as endocrine disrupters. It has been estimated that 70,000 xenobiotics may potentially be hazardous for humans and/or ecosystems. Water supply, urban drainage and wastewater treatment systems were originally designed to solve just conventional problems such as supply of potable water, flooding prevention and sanitation. The main problem within the conventional urban water cycle approaches is absence of design to deal with xenobiotics. Nowadays can be seen increased focus on rainwater use, wastewater reclamation and reuse in industrial and as well in domestic sector what increase the exposure to xenobiotics. Innovative approaches are therefore needed to prevent xenobiotics from being discharged into surface waters where they may give rise to impacts on the chemical water quality and ecological status of receiving waters as it is already recognized by the EU-Water Framework Directive. Under such circumstances it is needed to assess knowledge gaps within the integrated water management with a particular emphasis on xenobiotics.

Leaking sewer pipes, land application of treatment residues and increased focus on soil-infiltration of stormwater and wastewater further put the urban and peri-urban soil and groundwater resources at a potential risk that only rudimentary is accessed now. The integrated nature of the urban water systems and the ability of xenobiotics to spread across structural boundaries and into the environment where ecological systems and humans are exposed calls for an intersectorial and multidisciplinary approach to problem awareness and solution. Pollutants of interest have mainly been the conventional parameters (BOD, COD, N, P, SS and micro-organisms). Thus, there is a need to understand the sources, flow paths, fate (transport, treatment, natural attenuation) and impact of xenobiotics on both humans and environment in this technical system.
NATO Advanced Research Workshops (ARW) are advanced-level meetings, focusing on special subjects of current interest. This ARW on Dangerous Pollutants in Urban Water Cycle was held in Czech Republic under the auspices of the NATO Security Through Science Programme and addressed urban water management problems. It took place at Velke Bilovice (Lednice area), about 45 km from Brno.

The main purpose of the workshop was to critically assess the existing knowledge on Xenobiotics in urban water cycle, with respect to diverse conditions in participating countries, and promote close co-operation among scientists with different professional experience from different countries.

The ARW technical program comprised 31 papers on 4 topics, Challenges in Water Resources Management, Safety and Security of Water Supply and Sanitation, Xenobiotics and its treatment, Impact assessment and Wastewater Treatment and Reuse. Papers addressed a broad variety of issues corresponding to the ARW topics and ranging from reviews and case studies to scientific papers. The organizers hope that the workshop will contribute to improved water management in the regions addressed and thereby to a better security and quality of life.

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ACKNOWLEDGEMENT

Prof. Petr Hlavinek, Brno University of Technology, Czech Republic, and Prof. Ognjen Bonacci, University of Split, Croatia directed this Advanced Research Workshop (ARW). They were assisted by two other members of the workshop Organizing Committee, Dr. Jiri Marsalek, National Water Research Institute, Environment Canada, Burlington, Canada and Ivana Mahrikova, Slovak University of Technology Bratislava, Slovak Republic. NATO Security Through Science Programme granted the ARW. Special thanks are due to NATO Science Committee and in particular to Dr. Deniz Beten, Programme Director, Environmental Security, NATO who provided liaison between the workshop organizers and NATO.

Compilation of the proceedings typescript was done by Mr. Jiri Kubik, Brno University of Technology, Czech Republic. Mrs. Zuzana Jakubcova, Brno University of Technology, Czech Republic, and Stefan Stanko, Slovak University of Technology Bratislava, Slovak Republic performed communication and technical assistance. Special thanks to all contributors who make this workshop possible and fruitful.
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