Recent Progress in Slow Sand and Alternative Biofiltration Processes

Edited by Rolf Gimbel, Nigel J.D. Graham and M. Robin Collins

IWA Publishing

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Slow sand filtration is typically cited as being the first "engineered" process in drinking-water treatment. Proven modifications to the conventional slow sand filtration process, the awareness of induced biological activity in riverbank filtration systems, and the growth of oxidant-induced biological removals in more rapid-rate filters (e.g. biological activated carbon) demonstrate the renaissance of biofiltration as a treatment process that remains viable for both small, rural communities and major cities. Biofiltration processes are expected to become even more common in the future as efforts intensify to decrease the presence of disease-causing microorganisms and organic micropollutants in drinking water, to minimize microbial regrowth in distribution systems, and to enhance the cost-effectiveness and reliability of water treatment.

This book provides a state-of-the-art assessment on a variety of biofiltration systems from studies conducted around the world. The authors collectively represent a perspective from 23 countries and include academics, biofiltration system users, designers, and manufacturers.

It provides an up-to-date perspective on the physical, chemical, biological, and operational factors affecting the performance of slow sand filtration (SSF), riverbank filtration (RBF), soil-aquifer treatment (SAT), and biological activated carbon (BAC) processes. The main themes are: comparable overviews of biofiltration systems; slow sand filtration process behaviour, treatment performance and process developments; and alternative biofiltration process behaviour, treatment performance and process developments.

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# Recent Progress in Slow Sand and Alternative Biofiltration Processes

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# Contents

# Preface

Slow sand filtration is typically cited as being the first "engineered" process in drinking water treatment. Proven modifications to the conventional slow sand filtration process, the awareness of induced biological activity in riverbank filtration systems, and the growth of oxidant-induced biological removals in more rapid-rate filters, e.g. biological activated carbon, demonstrate the renaissance of biofiltration as a treatment process that remains viable for both small, rural communities and major cities. Biofiltration is expected to become even more common in the future as efforts intensify to decrease the presence of disease-causing microorganisms and disinfection by-products in drinking water, to minimize microbial regrowth potential in distribution systems, and where operator skill levels are emphasized.

As a contribution to this growing interest in slow sand and alternative biofiltration systems, the editors with the assistance of others, have held three previous international conferences on this theme beginning in London (November 1988), New Hampshire (USA-October 1991), and London and Amsterdam (April 1996). A fourth conference, held in Mülheim, Germany (May 2006), aimed to build on the success and momentum of the previous meetings by providing an updated perspective on the physical, chemical, biological, and operational factors affecting the performance of slow sand filtration (SSF), riverbank filtration (RBF), soil-aquifer treatment (SAT), and biological activated carbon (BAC) processes. The main themes of the conference encompassed: comparable overviews of biofiltration systems; slow sand filtration process behavior, treatment performance and process developments; and alternative biofiltration process behaviors, treatment performances, and process developments.

Compiled from the contributors to the *4th International Slow Sand and Alternative Biological Conference*, this book provides a state-of-the-art assessment on a variety of biofiltration systems from studies conducted around the world. The authors collectively represent a perspective from 23 countries and include academicians, biofiltration system users, designers, and manufacturers.

The editors would like to give special recognition to the conference sponsors and supporters including the IWA (UK), Federal Ministry of Education and Research (Germany), IWW Water Centre (Germany), RWE Aqua (Germany), Thames Water Utilities (UK), RWW (Germany), Amsterdam Water Supply (The Netherlands), Zürich Water Supply (Switzerland), AWWA Research Foundation (USA), University of Duisburg/Essen (Germany), Imperial College London (UK), and the Water Treatment Technology Assistance Center at the University of New Hampshire (USA). The editors extend appreciation to the distinguished members of the Programme Advisory Panel (listed separately) for their assistance in the selection of the conference papers. Finally, the editors wish to gratefully acknowledge Stefan Panglisch, Vaso Partinoudi, and especially Hans-Joachim Mälzer for their administrative assistance. The conference was truly an international enterprise and

such collaborative efforts are just one reason why biological filtration will continue its worldwide evolution.

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*May 2006*

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