

# **IAD - Expert Group Leaders' reports 2014**

## **Expert Group “Microbiology and Hygiene”**

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**2014**

### **Research activities (Projects)**

#### **A) Joint Danube Survey JDS 2013**

Members of the IAD and the ICC Water and Health ([www.waterandhealth.at](http://www.waterandhealth.at)) have organized the microbiological investigations during the Joint Danube Survey 2013. The survey took place from August 12 (Regensburg, Germany) till September 26 (Tulcea, Romania). Microbiological Research was mainly supported by a special FWF-project (P25817-B22), awarded to Alexander Kirschner and Andreas Farnleitner, with additional funding by ICPDR and the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management. With - in total - 3 microbiologists (2 part-time) on board, all 68 official JDS sampling sites plus 2 additional sites were sampled (54 Danube stations and 16 tributaries/branches). From most stations samples were taken from the midstream and the left and right river side. Microbiological research activities focused on pollution microbiology and on microbial ecology topics. Two important cooperations with colleagues from the Medical University Graz, Austria and the EU Joint Research Centre in Ispra, Italy were also established. First comprehensive results are published in the technical report of the ICPDR within 5 microbiology chapters. Peer-reviewed publications are planned for 2015 when all data are analysed.

In addition to the Joint Danube Survey, an annual investigation program was started in January 2014, with collaboration partners in Budapest (Prof. Erika Toth, Eötvös Lorand University, Budapest) and Belgrade (MSc Stoimir Kolarevic, Univ. Belgrade). Within this program, the microbiological analyses that were done during JDS3 are performed at three stations downstream of large cities (Vienna, Budapest, Belgrade) on a monthly basis to look for the temporal variability of the investigated parameters.

\*FWF-project P25817-B22: Establishing the basic microbial faecal pollution pattern along a large river: testing the longitudinal continuum vs. lateral discontinuum hypothesis at the River Danube (duration: 6/2013 – 5/2015)

Kirschner A, S Jakwerth, S Kolarevic, R Sommer, AP Blaschke, G Kavka, GH Reischer & AH Farnleitner (2014) Microbiology – Bacterial Faecal Indicators. In: Liska I, Wagner F, Slobodnik J (ed.) Joint Danube Survey 3, Final scientific report 2014. ICPDR, Vienna, Austria

Reischer GH, A Kirschner, G Schnitzer, D Savio, RL Mach, A Bahlmann, T Schulze, W Brack & AH Farnleitner (2014) Microbiology – Microbial Faecal Source Tracking. In: Liska I, Wagner F, Slobodnik J (ed.) Joint Danube Survey 3, Final scientific report 2014. ICPDR, Vienna, Austria

Zarfel G, B Folli, M Lipp, B Pfeifer, R Baumert, AH Farnleitner, A Kirschner & C Kittinger (2014) Microbiology – Ecotoxicological status and spread of non-wild type antibiotic resistant phenotypes in the river Danube. In: Liska I, Wagner F, Slobodnik J (ed.) Joint Danube Survey 3, Final scientific report 2014. ICPDR, Vienna, Austria

Kirschner A, S Jakwerth, S Kolarevic, B Premm, GH Reischer & AH Farnleitner (2014) Microbiology – Microbial Ecology. In: Liska I, Wagner F, Slobodnik J (ed.) Joint Danube Survey 3, Final scientific report 2014. ICPDR, Vienna, Austria

Lettieri T, V Ferrero, L Duque, R Carvalho, A Kirschner, AH Farnleitner & A Lahm (2014) Microbiology – Microbial Metagenomics. In: Liska I, Wagner F, Slobodnik J (ed.) Joint Danube Survey 3, Final scientific report 2014. ICPDR, Vienna, Austria

## **B) The Groundwater Resources Systems Vienna (GWRS-Vienna)**

goes in his fifth year. The project is a cooperation between the ICC Water & Health ([www.waterandhealth.at](http://www.waterandhealth.at)) and the IFUM, MA 39 (head Dr. Nadiotis-Tsaka). The project is developing, establishing and re-evaluating analytical methods and approaches required for (microbiological) water quality management of porous ground water resources within the complex of „large river – backwater interactions“ of the River Danube. The project is funded by Vienna Water (MA 31), the EU and realised in the frame of the FWF DKplus „Vienna Doctoral Programme on Water Resource Systems“

Recent Publications from the GWRS project:

Stevenson M, Blaschke AP, Schauer S, Z Matthias, Sommer R, Farnleitner AH & Kirschner AKT (2014) Enumerating Microorganism Surrogates for Environmental Applications Using Solid-Phase Cytometry. *Water, Air and Soil Pollution* 225: 1825-.

Derx, J., Farnleitner A.H., Blöschl, G., Vierheilig, J. & Blaschke A.P. 2014 (2014) Effects of riverbank restoration on the removal of dissolved organic carbon by soil passage during floods - A scenario analysis. *Journal of Hydrology* 512: 195-205.

Ryzinska-Paier, G., T. Lendenfeld, K. Correa, P. Stadler, A.P. Blaschke, R. L. Mach, H. Stadler, AKT Kirschner und A.H. Farnleitner (2014) A sensitive and robust method for automated on-line monitoring of enzymatic activities in water and water resources. *Water Science & Technology* 69: 1349-1358

## **C) Fecal Source tracking along the urban waste water pathway (GEBAM)**

The proposed research project will focus on the occurrence of human associated and

general faecal pollution indicators in communal waste water disposal as prevalent in the Austrian region and is an FWF funded project. It started in 2011 and will be run until 2015 (Group Farnleitner & ICC Water & Health). One advanced treatment plant in the Bavarian region is also included (Cooperation with Margit SCHADE und Willi KOPF, Bavaria). The outcome of the investigation is going to establish the general knowledge on the quantitative occurrence, persistence, resistance and predictability of human associated genetic faecal cells from human waste water sources. The following key issues will be addressed in detail: i) quantitative occurrence of general- and human associated in raw waste water in respect to population size, type of sewer system, and season, and ii) quantitative fate of g/h-GeBaM in comparison to standard and alternative indicators during primary and biological waste water treatment with respect to treatment type, treatment conditions and season.

Recent publications from the GEBAM project:

Farnleitner, A.H., Reischer, G.H., Savio, D.F., Frick, C., Schuster, N. Schilling, K., Mach, R.L., Derx, J., Kirschner, A., Blaschke, A.P. & Sommer, R. (2014) Diagnostik mikrobiologischer Fäkalkontaminationen in Wasser und Gewässern: Status Quo und gegenwärtige Entwicklungen. Wiener Mitteilungen 230: 157-184; ISBN:978-3-85234-124-8.

## Oral presentations

Farnleitner AH. et al. (2013) Microbial water quality management at all time scales: from faecal source tracking to near real-time water abstraction, 17th International Symposium on Health-Related Water Microbiology (WaterMicro 2013), Florianopolis, Brazil, 15 – 20 September.

Farnleitner AH et al. (2013) Microbial source tracking and the integrated approach of fecal pollution detection and management, HELENA “Ecosystem and Health” lecture series, Helmholtz Zentrum München, Deutsches Forschungszentrum für Gesundheit und Umwelt, 9.12.2013, invited lecture

Farnleitner AH et al. (2013) Molecular microbial source tracking, Lecture series in Microbial Ecology and Analytical Methods in Infection Biology, University of Uppsala, Evolutionary Biology Centre, Uppsala, invited lecture.

Farnleitner AH et al. (2014). Diagnostik mikrobiologischer Fäkalkontaminationen in Wasser und Gewässern: Status Quo und gegenwärtige Entwicklungen. ÖWAV Seminar, Abwasserreinigung: Werte erhalten, Effizienz steigern und Ressourcen schonen. 25.-26. Februar 2014, Wien

Farnleitner A.H. et al. (2014) The microbiological quality of water resources: current diagnostics and management. Orient Gate International Workshop on Forest & Water, 15.-16. Mai. 2014, Gmunden, Austria.

Farnleitner A.H. (2014) Risikobetrachtungen bei Trinkwasser aus mikrobiologischer Sicht. 124. ÖVGW Kongress und Jahrestagung, 21.-22. Mai, 2014, Salzburg.

Farnleitner A.H. et al, (2014) Microbial water quality management at all time scales: from molecular source tracking to near-real-time water abstraction at alpine karst water resources. 34. Symposium of the Austrian Society for Hygiene, Microbiology and Preventive Medicine, Bad Ischl, Salzburg.

Kittinger C & Kirschner A et al (2014) The Joint Danube Survey 2013 – An overview of the microbiological program and a first glance at the patterns of faecal pollution, ecotoxicological status and antibiotic resistance. 34. Symposium of the Austrian Society for Hygiene, Microbiology and Preventive Medicine, Bad Ischl, Salzburg.

## Poster presentations

Frick C, J Vierheilig, T Natiotis-Tsaka, A Kirschner, AP Blaschke, AH Farnleitner and R Sommer (2014) Microbial water quality at alluvial backwaters can be influenced by internal and external faecal pollution sources. 34. Symposium of the Austrian Society for Hygiene, Microbiology and Preventive Medicine, Bad Ischl, Salzburg.

Schnitzer G, A Kirschner, R Mach, AH Farnleitner & GH Reischer (2014) Integration of internal amplification control in quantitative PCR methods for microbial faecal source tracking. 34. Symposium of the Austrian Society for Hygiene, Microbiology and Preventive Medicine, Bad Ischl, Salzburg

## Other activities

### Editor activities

Water Science and Technology.

Water Science and Technology: Water Supply

UNESCO Global Water Pathogens Project

### Awards

Georg Reischer, The Austrian Microbiology Award 2014 from the ÖGHMP for the publication: Reischer G.H, JE Ebdon, JM Haider, N Schuster, W Ahmed, J Åström, AR Blanch, G Blöschl, D Byamukama, T Coakleyi, C Ferguson, G Goshu, GP Ko, AM de Roda Husman, D Mushi, R Poma, B Pradhan, V Rajal, M Schade, R Sommer, H Taylor, EM Toth, V Vrajmasu, S Wuertz, RL Mach and AH Farnleitner (2013) Performance characteristics of qPCR assays targeting human- and ruminant-associated bacteroidetes for microbial source tracking across sixteen countries on six continents. *Environmental Science and Technology* **47** (15): 8548-8556.

Julia Vierheilig, The Medeka prize for hospital and company hygiene during the 34<sup>th</sup> Annual Meeting of the ÖGHMP in Bad Ischl (02. - 05. June 2014). The prize was awarded for work on the evaluation of *Clostridium perfringens* as a faecal indicator: Vierheilig J, Frick C, Mayer R, Kirschner AKT, Reischer GH, Derx J, Mach RL, Sommer R and AH Farnleitner (2013) *Clostridium perfringens* is not suitable for the indication of fecal pollution from ruminant wildlife but is associated with excreta from non-herbivorous animals and human sewage. *Applied and Environmental Microbiology* **79** (16): 5089-5092.