



WATER & RISK

Dear Reader,

Here we are, at the end of 2013, the International Year of Water Cooperation. The objective of the Year was to draw attention to the benefits of cooperation in water management.

Cooperation in water management protects the environment, preserves water resources, creates economic benefits and promotes social and gender equality. Water knows no borders, and 148 countries share at least one trans-boundary river basin. Water cooperation also helps to generate security and build peace.

The water cooperations in which I have been personally involved have seen an awesome development this year. While January started cold and quiet in Germany, the year ended with tropical heat in Cameroon. In the time between, our Collaborating Centre was re-designated, a large Legionella outbreak was noticed and surveyed, visitors were welcomed, field trips organized, projects were finished and others just started. Some people left us to work in different places and many new people entered my life.

Nelson, Thomas, Jaquie, Khalid, Louisa, Susanne, Daniel, Alex, Peggy, Andreas, Line, Clare, Esther, Katrin, Erick, Mary, Fred, Scott, Nicole, Peter, to name just a few. With some I only met up for a short while, but with others I was able to share more time and I am looking forward to whatever cooperation will develop in the future. Not all of them work in the field of water and risks, but for all of them water is an essential part of their life. They become aware of unusual rain patterns, provide hand-washing facilities for their customers, lack sufficient water supply at work or home and are exposed to floods.

Despite all the risks, most of us enjoy water in our environment. Who doesn't smile, when the first snow falls or the first rain begins at the end of dry season and a rainbow appears in the sky?

Whatever water event makes you smile, I hope there will be many of them in 2014, which is UN Year of Family Farming and Year of Crystallography.

Wishing all of you happy holidays and a peaceful start to 2014.

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Hygienic-technical factors and Legionella pneumophila in drinking-water installations

The influence of hygienic-technical factors on the systemic colonization of drinking-water installations with *Legionella pneumophila*. First results of the collaborative research project "Biofilm-Management", funded by the Federal Ministry of Education and Research (BMBF).

Introduction

Normally it is necessary to draw conclusions from only a little information about the hygienic microbiological situation of an entire drinking-water installation system. This in turn has consequences for the conception and implementation of renovation work and surveillance.

Within the scope of the collaborative research project funded by the BMBF: "Biofilm Management: Recognition, risk and control of viable but non-cultivable (VBNC) pathogens in drinking-water installations", this problem will be addressed under the title "Development and evaluation of a rational spatial-temporal sampling regime for the efficient and reliable detection, monitoring and interpretation of microbial contamination in drinking water installations".

The aim of the subproject is to gather systematically relevant details (materials, geometry, utilization etc.) together with a spatially and temporally continuous sampling of different drinking-water installations with known mi-



Figure 1: Discoloration of water taken from the drinking water pipeline
Source: IHPH





Figure 2: Insufficient insulation of the piping
Source: IHPH

icrobial contamination, and to develop and evaluate empirically-based, rational screening strategies for the fast, secure and cost-effective detection, characterization and monitoring of systemic microbial contamination, in order to formulate evidence-based advice for the screening of drinking-water installations in the field.

Methods

The choice of suitable objects of investigation was coordinated with the public health department, Cologne, and covered a wide variety of usages, materials, dates of construction etc. of drinking water installations, in order to represent an intersection of driven drinking-water installations.

In all, 8 examination objects were selected. The difficulties of the buildings focus on a systemic contamination of the hot-water system (PWH) with *Legionella pneumophila*. Through the analysis of plans and data about the usage, on-site visits, qualitative interviews with owners, operators, staff and responsible specialized companies and taking into consideration relevant guidelines and insights from the BMBF project: “Biofilms in installations of buildings” completed in 2010, the structures and characteristics of installations were accurately gathered.

For each selected object, the standardized recording of diverse on-site parameters such as temperature, pH-value, electrical conductivity and organoleptic properties was determined.

A continuous net of sampling points was defined according to the characteristics of the installations. In the first stage, samples from 40 different, representative sampling points were examined on consecutive occasions. With the results, a fine-meshed overview of the occurrence of *L. pneumophila* was compiled for each building. The subsequent period of monitoring, comprising fifteen unvarying sampling points and four sampling dates, lasted half a year.

Results and Discussion

Although systemic contamination was already evidenced, the results of the analysis show that significant *L. pneumophila* was proven only in one building. To be represen-



Figure 3: Poor accessible sampling point
Source: IHPH

tative, the analysis focused on the first five buildings of the survey. In these five buildings, $n=557$ samplings were examined, referring to specific levels of contamination and following worksheet W 551, published by the ‘German Technical and Scientific Association for Gas and Water’ (DVGW). No or minor contamination (< 100 CFU/100ml) was found in 67% of all samplings. An intermediate contamination (≥ 100 CFU/100 ml) was found in 25% of all samplings and 8% of the samplings indicated high or very high contamination.

In building A, most samplings were proved positive regarding *L. pneumophila* (about 90% > 0 CFU/100ml). Least contaminated were the samplings of building D, where only 60% were tested positive.

Within a biannual interval, an ongoing transgression of the technical value at which action is to be taken (≥ 100 CFU/100 ml) was proven in building A and F at no sampling point, in Building B and E at one site and in Building D at two sampling points.

The characteristic features of the sampling points which showed concentrations of *L. pneumophila* above the technical value at which action is to be taken were: slight withdrawals of water, a long stagnation period, the discoloration of water (Fig. 1), long piping routes leading from the drinking water heater, non-compliance of the 5-K-rule, insufficient insulation of the piping (Fig. 2), poor accessibility (Fig. 3) and the lack of circulation lines.

The sampling was hindered by a confused and far-branched pipe network, pipelines with no flowing water or dead pipes (see illustration 4), undefined or changing contact persons, insufficient knowledge of the drinking water installation system, as well as missing expertise on the part of the operator and no accordance with the recognized rules of engineering.





Figure 4: Dead pipe end
Source: IHPH

The PWH flow pipe and the PWH-C return pipe (circulation waters) showed *L. pneumophila* concentrations in all samples of every single building below the technical value at which action is to be taken. Concentrations of over 100 CFU/100 ml were recorded within the building at numerous riser pipes.

Conclusion

Contaminations represent multi-factorial, variable events. The varying course of a microbial contamination with an apparently coincidental distribution demands a high standardization degree of examination strategies. An item-specific choice of sampling sites made by trained specialist staff is therefore essential.

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For further information visit:
<http://www.biofilm-management.de/node/12>

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Up and down-water quality in Yaounde – notes from the field

The water supply in the City of Yaounde is sufficient on average, but shortages in the supply of tap water force a high proportion of the population to use alternative water sources, such as natural springs and dug wells. Often the water quality is not suitable for human consumption and promotes water related diseases.

The German Federal Ministry of Education and Research has funded a Mobility Measure which enabled members of the Waste Water Research Unit (WWRU) of the University of Yaoundé to visit the Institute for Hygiene and Public Health (IHPH) at the University of Bonn. During their stay, the Cameroonian researchers were trained in the analysis of coliphage in water and had the opportunity to learn about German wastewater and drinking-water treatment. In exchange, two scientists of the IHPH traveled to Yaounde, Cameroon, during December 2013. The German guest scientists worked closely together with the students of the WWRU to increase scientific knowledge in the field of water quality, sanitation and



Figure 1: Measuring the on-site parameters at a water source
Source: IHPH

hygiene. Besides discussing sampling strategies and the microbiological detection methods for coliphages and *Escherichia coli* to measure viral and faecal contamination





Figure 2: Natural spring used by approximately 50 persons as drinking water source
Source: IHPH



Figure 3: Sampling and documentation of sampling point characteristics at a spring used by more than 500 people as a source for drinking water.
Source: IHPH



Figure 4: Well maintained dug well with a hand pump used by 400 people as drinking water supply
Source: IHPH

of natural water sources, one main topic was an ongoing training in good laboratory practice and quality assurance. The master and PhD students of the WWRU designed sampling-sheets that contained relevant information to be gathered in the field during the sampling, and tables to document the measured on-site parameters. Additionally, sheets to document the microbiological results produced in the laboratory were set up.

Information covered in the sampling sheet dealt with the location and structure of the sampling point and could be used for hygienic risk assessment of the different water sources, based on the sanitary inspection procedure of the WHO.

During 10 field days, 37 samples were taken and analysed. Each field work day was followed by one day for evaluating the sampling-sheets, analyzing the physical, chemical parameters and obtaining the microbiological results. Samples from 22 natural springs and 15 dug wells in 13 different urban quarters were analyzed. Each sampling point and its surroundings were photographed and characterized with regard to waste and animal pollution and the existence of protection measures. If available on-site, the residents of the quarter were questioned about usage behaviour and potential shortcomings during the dry season.

The visited water sources ranged in the risk assessment from low, intermediate, high to very high and showed different microbiological contaminations. The wa-

ter source with a very high risk did not automatically result in a high contamination, and therefore further analysis of the recorded catchment conditions are currently being undertaken.

So far, only 40 percent of the alternative water sources have a quality suitable for human consumption, although they serve thousands of people in the city area.

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Third MoP to the Protocol on Water and Health – a recognized instrument to promote human health

Fourteen years ago, the Protocol of Water and Health was signed by a total of 36 countries in London. Its main aim is to promote the protection of human health and well-being through improving water management, including the protection of water ecosystems, and by preventing, controlling and reducing water-related diseases. The Protocol is the first legally binding international agreement of its kind adopted specifically to attain an adequate supply of safe drinking-water and adequate sanitation for everyone, and to effectively protect water used as a source of drinking-water.

In 2005, after 16 signatories had completed the ratification process, the Protocol came into force. The first Meeting of the Parties (MoP) was then held in Geneva (Switzerland) in 2007, followed by the second MoP in Bucharest in November 2010. Recently, the third session of the MoP to the Protocol on Water and Health took place on 25-27 November 2013 in Oslo, Norway. It was organized by the Joint Secretariat of the Protocol, i.e. UNECE and WHO Regional Office for Europe, at the kind invitation of the Government of Norway. Some 150 participants, representing Parties and non-Parties from the WHO European region, intergovernmental organizations and non-governmental organizations (NGOs) attended the session which took place at 'Hoyres Hus' near the National Theatre in the heart of Oslo.

After three years of extremely successful commitment, Mr. Kjetil Teivtan (Norway) stepped down from the position as Chair of the Bureau, but was re-elected as Vice-Chair. As his successor, Mr. Pierre Studer (Switzerland) was elected as Chair for the next three years, and Ms. Marta Vargha (Hungary) was elected as another Vice-Chair. Representatives from Belarus, Finland, France, Germany, Portugal and Romania were elected as members of the Bureau.

The Meeting of the Parties discussed and adopted a new programme of work for 2014-2016 to further strengthen the promotion of human health and well-being and the reduction of water-related diseases. Work on improving governance for water and health by supporting the setting of targets and implementing measures, as well as work on the prevention and reduction of water-related diseases, will remain the cornerstones of the work under the Protocol. Further work on small-scale water supply and sanitation and equitable access to water and sanitation to translate the human right to water and sanitation into practice will be carried out. Assistance to countries to support implementation at the national level and the work of the Compliance Committee will also contribute to facilitate implementation of the Protocol. In addition, in order

to answer to today's challenges, a new area of work was included on safe and efficient management of water supply and sanitation systems. Seven programme areas (PAs) with 17 work packages are addressing the following issues:

1. improving governance for water and health (Lead Parties: Switzerland, Romania)
2. prevention and reduction of water-related diseases (LPs/organization: Norway, Belarus, Hungary, Georgia, WHO/Europe, for different work packages)
3. small-scale water supplies and sanitation (LPs/organization: Germany, Serbia, WECF)
4. safe and efficient management of water supply and sanitation systems (LP/organization: Portugal, IWA)
5. equitable access to water and sanitation; (LPs: France, Hungary)
6. assistance to support implementation (responsible body: Bureau)
7. compliance procedure (responsible body: Compliance Committee)

The overarching objectives of the programme will be to strengthen synergies between different areas of work under the Protocol, and to contribute to relevant regional and global efforts (human right to safe drinking water and sanitation, MDGs, Health2020 etc.).

Our WHO CC Bonn will actively contribute to the work as a partner institution in the following work packages: Atlas of Water and Health (under PA 1); Strengthening water-related disease surveillance, outbreak detection and management (under PA 2); and Capacity-building on water & sanitation safety plans (under PA 4).

Without any doubt, also for countries within the WHO European region, many problems concerning water, sanitation and health remain to be solved. But the participants of MoP left the convention with optimism, enthusiasm and zest for action. The Protocol is long since recognized as a highly useful instrument to promote human health, by creating rich opportunities for exchange of experiences, intensive cooperation and inspiring discussions. 'Au revoir' at the fourth MoP in Switzerland in 2016!

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Atlas on Water and Health 2.0

Background

The Protocol on Water and Health is the first international convention on health promotion by improving access to safe drinking water and adequate sanitation. According to the UNECE, 120 million people do not have access to safe drinking-water or adequate sanitation in the European part of the UNECE region. An improvement could prevent 30 million cases of water-related diseases. Since 1999, 24 countries have signed the protocol in the European WHO region. Parties to the Protocol on Water and Health are required to adopt national targets for improving access to safe water and sanitation, the reduction of water-related diseases, and to monitor and report progress towards these targets.

Article 9 Paragraph 4b of the Protocol specifies that Parties shall encourage development of information systems to handle information on long-term trends, past problems, current concerns and successful solutions to them in the field of water and health.

In response to this requirement, “The Atlas on Water and Health” (“the Atlas”) has been developed by the WHO Collaborating Centre for Health Promoting Water Management and Risk Communication at the Institute for Hygiene and Public Health (IHPH), University of Bonn.

What is the Atlas on Water and Health?

The Atlas is a data management tool using geographic information system (GIS) technology and aims to serve as a one-stop information source on sustainable use of water resources, access to improved drinking-water supply and sanitation, as well as the magnitude of water-related diseases.

The first version of the Atlas was launched at the Ministerial Conference on Environment and Health in Parma, Italy, in 2010. The WHO European Centre for Environment and Health in Bonn has supported the update of the Atlas in collaboration with the IHPH. The scope, design and updated version of the Atlas were reviewed by country representatives at regional meetings on the monitoring of water supply and sanitation (October 2012 and June 2013, Bonn). The final version of the updated Atlas was introduced in October 2013 at the “Third session of the

Meeting of Parties to the Protocol on Water and Health” in Oslo. It can be accessed at <http://waterandhealth.eu>.

The updated version of the Atlas includes various visualizations which allow one to combine different aspects from diverse databases while simultaneously exploring the outcome along a timeline. Besides the presentation within the Atlas, the resulting interactive diagrams or maps may be reused in other online reports which refer to a specific country, indicator or outcome of interest.

The Atlas relies solely on existing public data sources with established mechanisms of data collection (Fig. 1), such as WHO/UNICEF JMP, World Bank, United Nations Developing Programme, Centralized Information System for Infectious Diseases (CISID). The Atlas database is updated regularly from these sources.

Country-specific data for 244 countries is provided. The database focuses on the WHO European Region and presents four main themes covering a time span from 1980 to 2012. The main themes are country background, water, sanitation and health-outcome data. The data can be presented in the form of maps complemented by various types of graphic representations. In addition to visual presentation, the Atlas includes explanatory texts in order to help understanding and informed judgment.

Added value of the Atlas

- The Atlas is a harmonized platform containing data from global and regional monitoring systems in water, sanitation and health: a combination which is not provided by other presentations. It facilitates dissemination of the results of these efforts and offers analytical tools for country-specific information retrieval and informed decision-making.
- The Atlas serves as a complementary information source for countries in setting targets under the Protocol and is a good tool for communicating and presenting achievements.
- The Atlas can be used as an online visualization service, supporting electronic reporting and data-provisioning and evaluation. The Atlas includes various visualization techniques, each including temporal aspects, allowing an overview of processes and efforts over time.
- The Atlas contributes to monitoring implementation of the RPG I of the Parma declaration and it links with the European Health and Information System (EHIS).

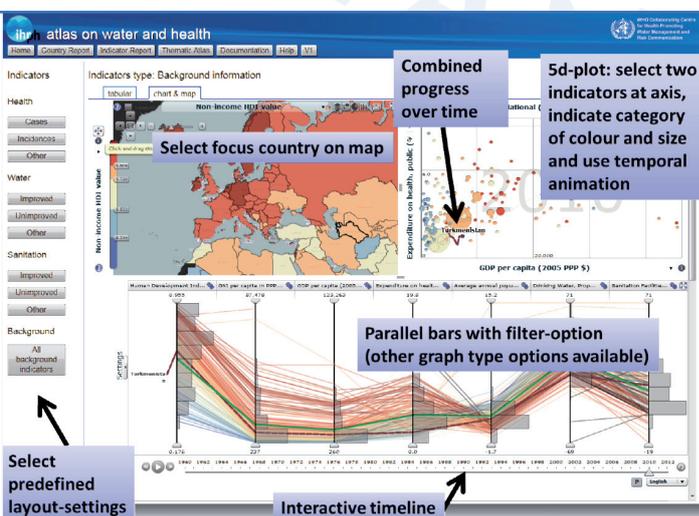


Figure 1: A screenshot sample of the new layout
Source: IHPH



Visit the Atlas on Water and Health:
<http://www.waterandhealth.eu>

For further information contact:
info@whocc-bonn.de



Source: Anna Abels

IWA Young Water Professionals Germany visit the WHOCC in Bonn

As a global network for water scientists, the international water association (IWA) numbers over 10.000 members worldwide. To develop a link between water-related research and practice, the IWA organizes numerous events, in which all aspects of the water cycle are discussed.

Since 2006, the IWA has established the Young Water Professionals (YWP) program, which is aimed at young water scientists under the age of 35. The YWP program serves as a platform for young water scientists to develop a network, share experiences with others and plan their professional careers. Over the years, several YWP country chapters have been constituted. The German YWP chapter was established in 2012. In close cooperation with the German Association for Water, Wastewater and Waste (DWA) and the German Technical and Scientific Association for Gas and Water (DVGW), the chapter organizes workshops and conferences and is present at fairs to bring together young water professionals from different special fields.

After the first successful workshops, which took place at a waterworks of the Gelsenwasser AG and at the DWA, the YWP chapter Germany was invited to the World Health Organisation Collaboration Centre (WHOCC) integrated in the Institute for Hygiene and Public Health (IHPH) at the University of Bonn. During the workshop, the visiting YWPs were informed in detail of what the tasks of a WHOCC are and how an institution can become a WHO network partner.

The WHOCC in Bonn focuses on water, sanitation and health and provides its expertise to support the WHO in their wide range of tasks. The YWPs were introduced to several water hygiene projects on which the WHOCC is working. In addition, a presentation was given on the WHO European Centre for Environment & Health

(ECEH), which is also located in the city of Bonn. The European Centre for Environment and Health (ECEH), established in 1991, operates as a centre of scientific excellence for the WHO in Europe, providing Member States with state-of-the-art evidence on the nature and magnitude of existing and emerging environmental health risks, and assisting them in identifying and implementing policies to address these risks.

The YWPs were subsequently given the opportunity to get an insight of the laboratories for experimental environmental microbiology and Geo Information Systems (GIS) during an extended guided tour. The workshop concluded with a presentation on the WHO/UNECE Protocol on Water and Health, which is the first major international legal initiative for the prevention, control and reduction of water-related diseases in Europe.

The Protocol was adopted in 1999 at the Third Ministerial Conference on Environment and Health and came into force in 2005, becoming legally binding for the ratifying countries. So far, 36 countries have signed and 24 ratified it. Signatories agreed to establish and maintain comprehensive national and/or local surveillance and early warning systems to prevent and respond to water-related diseases. They also agreed to promote international cooperation to establish joint or coordinated systems for surveillance and early warning systems, contingency plans, and responses to outbreaks and incidents of water-related diseases and significant threats of such outbreaks.

After a very interesting and inspiring workshop, the Young Water Professionals had the opportunity to discuss what they had learnt about the activities of the WHO in the field of water and sanitation during dinner in the city of Bonn.

On behalf of all participants, the YWP chapter Germany would like to thank Professor Kistemann as head of



the WHOCC and his colleagues for the kind invitation and professional organization of this workshop.

Besides upcoming workshops and fairs, the highlight for the YWP chapter Germany in 2014 will be the organization of the first IWA Young Water Professionals Conference in Germany: "Advanced Wastewater Treatment and Water Reuse – The Future is Now", which will take place on June 11th 2014 in Essen, Germany. The event is planned as a pre-conference to the specialized IWA conference "Activated sludge... 100 years and counting". The main topics of the conference will be:

- Removal of Micropollutants
- Enhanced Nutrient Removal
- Effluent Disinfection
- Life cycle assessment and energy considerations regarding the above topics

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New Master's programme

"Geography of Environmental Risk and Human Security"

The University of Bonn and the United Nations University (UNU-ViE) in Europe have launched the first joint Master's programme organized by a state university in cooperation with a UN institution.

This Master's programme represents a major achievement in post-secondary education policy and international law. It is the first time that a university grounded in national university law and a UN institution based on international law have successfully joined forces as institutions. "This joint programme will serve as a model for academic partnerships with UNU. Consequently, as a prototype for additional courses of study, the eyes of the world will be on us. And Bonn as a Federal city will become even more visible as the German location of the United Nations" explained Professor Fohrmann.

According to NRW-science Minister Svenja Schulze, by being involved in this initiative, Bonn is writing a chapter of "international post-secondary education history". She emphasized the programme's significance for handling risks such as natural forces, climate change, and environmental destruction by adding, "Consequently, this new course of study will focus on humans, linking the great global challenges in environmental and climate protection to security issues. I hope that this Bonn Master's programme will serve as a global model."

Professor Rhyner, who chairs the Institute for Environment and Human Security at the United Nations University (UNU-EHS) in Bonn, hopes that this course of study will send a message, "There is a great global need for innovative courses of study that represent a bridge between research and application. With this new Master's

programme, we are taking an important first step here in Bonn. We will teach students both the scientific basis as well as its application in the context of international organizations. We hope that this innovative model can also be adopted by other universities and partner organizations."

This joint English language programme will award successful students a "Master of Science" (M.Sc.) degree. In four semesters, in addition to completing teaching modules, participants will perform an internship at a UN or other international organization, as well as write a master's thesis. In its first year, the programme accepted 25 students from 14 different countries, with roughly half of all students coming from Germany. On the side of the University of Bonn, the Department of Geography (Geographisches Institut; GIUB) has assumed teaching duties in the programme, and on the United Nations University side, the Institute for Environment and Human Security (UNU-EHS). Prof. Dr. Chinwe Ifejika Speranza holds the new chair for environment-related risk and vulnerability research. Teaching activities will build on the proven research cooperation between the UNU and the University of Bonn.

For further information visit:

<http://ehs.unu.edu/article/read/msc>

References

<http://ehs.unu.edu/article/read/focus-on-environmental-risks-and-human-security-university>



Events on Water, Health and Risk Communication

January

**11th EverythingAboutWater Expo 2014
International Exhibition & Conference**
09-11 January
Dehli India
<http://www.eawater.com/expo/>

International Water Summit
20-22 January
Abu Dhabi, United Arab Emirates
<http://iwsabudhabi.com/portal/home.aspx>

February

17th African Water Association Congress
17-20 February
Abidjan, Côte d'Ivoire
<http://www.afwacongress2014.org/en/index.php>

Unclogging the Blockages in Sanitation: East and Southern Africa Action Exchange
17-20 February
Kampala, Uganda
<http://www.susana.org/lang-en/conference-and-training-materials/833-unclogging-the-blockages-in-sanitation-february-2014>

March

World Water Day 2014 – Water and Energy
22 March
<http://www.unwater.org/wwd2014.html>

IWA Regional Symposium on Water, Wastewater and Environment: Traditions and Cultures
22-24 March
Patras, Greece
<http://wwetc2014.env.uwg.gr/wms/>

WASH Conference 2014
24-28 March
Brisbane, Australia
<http://www.watercentre.org/events/wash2014>

April

Third Sanitation and Water for All Global High Level Meeting
11 April
Washington DC, USA
<http://sanitationandwaterforall.org>

May

IFAT
05-09 May
Munich, Germany
<http://www.ifat.de/en/Home>

Water Quality 2014
13-15 May
Champaign, Illinois, USA
<http://www.accwa.net/water-quality-2014/>

4th European Conference on Sludge Management - ECSM 2014
26-27 May
Izmir, Turkey
<http://www.ecsm2014.org>

11th IWA Leading Edge Conference on Water and Wastewater Technologies
26-30 May
Abu Dhabi, United Arab Emirates
<http://let2014.org/>

5th Africa Water Week
26-30 May
Dakar, Senegal
<http://www.africawaterweek.com/index.php>

6th IWA Eastern European Young Water Professionals Conference „East meets West“
28-30 May
Istanbul, Turkey
<http://www.eu-ywp.pwr.wroc.pl/>

June

Singapore International Water Week 2014
01-05 June
Singapore
<http://www.siww.com.sg>

ECWATECH-2014, 11th International Forum “Water: ecology and technology” and Wastewater Technologies
03-06 June
Moscow, Russia
<http://www.ecwatech.com/2014/index.php?lang=en>

Water supply and wastewater treatment in towns and communities
04-05 June
Moscow, Russia
http://www.ecwatech.ru/2014/index.php?content=list§ion_id=233

1st YWP Conference Germany: Advanced Wastewater Treatment and Water Reuse – The future is now!
11 June
Essen, Germany
<http://www.iwahq.org/2bv/events/iwa-events/2014/ywp-conference-germany.html>

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