



LOOKING INTO A SUSTAINABLE **WATER** FUTURE

A COLLECTION OF ESSAYS
ON DEVELOPMENTS, TRENDS
AND TECHNOLOGIES

To be published in fall 2022



Born in Wels (Upper Austria), was member of the European Parliament from 1996 to 2019 and belonged to the European People's Party (EPP). He is married and has two children.

In the European Parliament Paul Rübige was full member of the Committee on Industry, Research and Energy and the Committee on Budgets. In addition, he was substitute member of the Committee on Development and in the Committee on International Trade. He was Chairman of STOA (Panel for the Future of Science and Technology), an official body of the European Parliament that is supported by external experts such as universities, scientists or research institutes

Paul Rübige is very active in the field of the small-scale business promotion. He is president of SME Global, a working group of the International Democrat Union (IDU), whose objective it is to support small and medium-sized enterprises (SME) and to improve their business environment.

In 2019 Paul Rübige was appointed to the Advisory Board of Rübige Holding GmbH. He is also member of the Governing Board of the EIT (European Institute of Innovation & Technology) and member of the European Economic and Social Committee.

In 2022 Paul Rübige was appointed as External Advisor to the Board of Directors of Water Europe.



Dr. Paul Rübige

Member of the Administrative Board of the European Institute for Innovation and Technology; Member of the European Economic and Social Committee.

THE INTENTION

The World is changing every day and we have to find good options for our future. Options assessment with the right foresight strategy could help to make the right decisions. With impact assessment studies we can learn how to do better. The sustainable development goals need a lot of Innovation to have a good return of investment for the people's income. We need food and feed, water and sanitation, renewable and efficient energy production with a clean and blue economy ocean.

The European research area, the research and innovation strategy together with the five missions can help to be aware of emergency preparedness and new technologies with higher education, skills and vocational training. The value chain and lifetime cycles studies should give a global development of sustainability. From UN to our kindergardens we have use the existing knowledge with new learning and teaching technologies.

SMEs and Family Business can play a big role to develop individual, personalised solutions with services and product which could be chosen by informed consumers. Therefore, we want to produce a knowledge driven book with scientists, researchers and innovative entrepreneurs which can help to understand what taxpayers should finance. All institutions and organisations are responsible to deliver the right answers.

Just do it. Let's start a new process with financial engineering, databases and machine learning to predict a trusted future.

THE IDEA

Water management is much more than just a business. Water is one of the fundamental foundations of life. Access to clean water and sanitary facilities was declared a human right by the UN in 2015. Clean water is perceived as a common good, as a central element in environmental protection, as a political responsibility and as a symbol of public prosperity. Water is critical for our economy, food security, environment, and the well-being of our citizens.

Water scarcity, pollution of our fresh water sources, and the effects of more frequent and intense floods and droughts can have severe economic impacts. To prevent these risks, investments in water infrastructure, in technologies for water-efficiency in industrial and agricultural sectors, and in the restoration and maintenance of well-functioning natural water systems are necessary.

Technological and non-technological innovation will be essential to address these water challenges and to keep the cost of the solutions affordable. Innovation is quickly and inevitably changing the way we think and provide infrastructure services.

This volume compiles answers to current water challenges and shows solutions (technological and non-technological innovations) and best practices from experts in their field. In every single essay, professionals express what they believe in and showcase their expertise.

The book aims to address government officials and authorities, companies, NGOs as well as academics so that a dialogue about the current challenges in water and wastewater management and the relevance of the SDG6 will be brought to the forefront.

SDG6: ENSURING AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL.

The SDG6 (Sustainable Development Goal No. 6) specifically requests to ensure availability and sustainable management of water and sanitation for all.

Targets

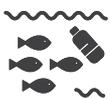
DRINKING WATER

achieve universal and equitable access to safe and affordable drinking water for all



WATER POLLUTION

improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally



SANITATION AND HYGIENE

achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations



WATER-USE EFFICIENCY

substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity



INTEGRATED WATER MANAGEMENT

implement integrated water resources management at all levels, including through transboundary cooperation as appropriate



INTERNATIONAL COOPERATION

expand international cooperation and capacity-building support to developing countries in water and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies



PROTECT AND RESTORE WATER ECOSYSTEMS

protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes



LOCAL COMMUNITIES

support and strengthen the participation of local communities in improving water and sanitation management



THE AUTHORS

Global water security challenges and solutions

- **Water availability and the inevitability/ importance of water reuse**
- **Water quality challenges related to PMT (Persistent, Mobile and Toxic) substances**
- **Digital water transformation of water services**

by Ruud Bartholomeus

Chief Science Officer of KWR, Principal Scientist of the Ecohydrology team and Senior Coordinating Researcher at Wageningen University

Aligning regional freshwater supply and demand is central to his work. This involves combining scientific knowledge and technological solutions such as (cross-sectoral) water reuse, sub-irrigation with (industrial) residual water, and online management of climate-adaptive drainage with the process of having water managers, drinking water utilities, industry and farmers work together to achieve sufficient freshwater.



Water and Public Health

by Cristian Carboni

Light Industries Market Manager of Industrie De Nora S.p.a.

More than 20 years of experience in project management, research and technological innovation, author of numerous scientific publications. In Industrie De Nora he collaborates in the development of technologies relating to water and wastewater treatment in particular concerning disinfection.

Member of the scientific committee of Polo Agrifood, member of the Board of Directors of the International Ozone Association, Leader of the Water Europe Working Group Water and Public Health.

Since 2017 he has collaborated with the Executive Agency for Small and Medium-sized Enterprises (EASME) for the monitoring of the Actions under Horizon 2020; currently external expert of the European Innovation Council and Executive Agency for SMEs (EISMEA).



Water and Sustainable Agrifood Systems by Rafael Casielles

Chemical Engineer and Senior project manager in BIOAZUL

With more than 14 years' experience in R&I projects devoted to different fields like water treatment, sustainable sanitation, solid waste management, and agriculture. In the last years, he has focused on water reuse in agriculture analyzing the technology needs for water reclamation and the barriers for upscaling innovations.

He has coordinated several R&I projects on circular economy applied to the agricultural sector such as SUWANU EUROPE, RICHWATER and TREAT&USE. He was member of Body of Knowledge of EIT programme on water scarcity in 2021.

He is currently co-leading an international consortium called BONEX to develop practical tools to implement WEFE Nexus approach in the Mediterranean.



Water Data Space: Challenges and Opportunities by Roberto Di Bernado

Senior Researcher and Head of the R&D Open Government Unit, part of Open Public Service Innovation Lab

He is an Electronic Engineer with Professional Master's diplomas in "Clinical Engineering" and in "Internet Software Engineering". He has been working as researcher at Engineering R&D Laboratory since 2004, being involved in management and technical activities in many Italian and European projects.

He is also acting as R&D opportunities and network developer for the entire Open Public Service Innovation Lab. The lab is involved, among others, in the following projects: PathoCERT (H2O2O-SU-DRSO2), WQeMS (H2O2O- LC-SPACE-18-EO), B-WaterSmart (H2O2O-CE-SC5-O4), Gotham (PRIMA).

At the moment, Roberto is coordinating URBANAGE project (H2O2O-DTtransformations-O2), leading the Smart Governance and Smart Cities sub-group of the Big Data Value Association, co-leading the Smart Cities Domain Committee of the FIWARE Foundation and the Digital Water Systems Working Group of Water Europe.



Water Stewardship Action in the Beverage Industry

by Michael Dickstein

During 20 years mainly in the FMCG sector, Michael Dickstein has gained broad experience in reputation and stakeholder strategy, ESG, corporate affairs and communication.

Among other roles, he was Heineken's Global Director Sustainable Development and Group Director Sustainability & Community for CocaCola HBC.

His focus areas comprise of climate action, water stewardship, circular packaging schemes and community engagement, but also crisis management and corporate advocacy. Michael graduated from Law School in Linz/Austria. He started his career in European Parliament.

Global water security challenges and solutions

- **Water availability and the inevitability/ importance of water reuse**
- **Water quality challenges related to PMT (Persistent, Mobile and Toxic) substances**
- **Digital water transformation of water services**

by Milou Dingemans

Chief Science Officer of KWR and guest researcher at the Institute for Risk Assessment Sciences at Utrecht University

Dr. Dingemans is European Registered Toxicologist and has over 15 years' experience in scientific research into the harmful effects of chemicals on health. She works on the evaluation of possible health and water quality issues of substances in the water cycle on commissions from water utilities, government and industry, and the development, validation and implementation of innovative monitoring and risk assessment methodologies.





Water and Biodiversity

by Sara Eeman

Program Manager Resilient Water Systems
at Aveco de Bondt/Dareiu

Sara has worked in water-related research, education and business for more than 15 years. After the MSc Applied Earth science at TU Delft she finished a PhD on groundwater salinity at Wageningen UR.

She added to the development of the Land- and Water management course at Van Hall Larenstein Applied University as teacher and coordinator. Besides she was involved in several research programmes concerning sustainable river management, and was one of the founders of the joint venture master program River Delta Development (VHL, RH and HZ Applied Universities).

Since two years she is program manager Resilient Water Systems at Aveco de Bondt/ Dareius, focusing on integral approaches for water management, including the development of biodiversity/ecology structures within the company. Since this year, she leads the new workgroup on Water and Biodiversity.



Water Data Space: Challenges and Opportunities

by Rafael Gimenez

Head of the Digital Team at Cetaqua

Rafael Gimenez is the Head of the Digital Team at Cetaqua, the Water Technology Centre, which works in the application of Artificial Intelligence and scalable technologies to the water cycle and the sustainability.

As a Software Engineer and Senior Researcher, he's been working for more than 8 years as R&D Team Manager in the field of AI.

Before joining Cetaqua, Rafael served for more than 8 years as Researcher and Research Area Manager at BDigital Technology Centre, with a special contribution in the definition and launch of the Big Data Center of Excellence.



Hydropower – Sustainability, Security of Supply and System Stability
by Achim Kaspar

Member of the Board of VERBUND AG

Achim Kaspar is Member of the Board of VERBUND AG – Austria’s leading electricity company and one of the largest producers of electricity from hydropower in Europe.

He assumed the role as COO in January 2019 and is responsible for digitization as well as the VERBUND generation portfolio which includes the oversight of 130 hydropower plants.

Prior to joining VERBUND he held various management positions in the Utility and Service Provider Industry as well as in the Austrian Telecommunication Industry.

From 2008 - 2018 Achim Kaspar was General Manager at Cisco Austria / Slovenia / Croatia.

Lorem Ipsum
by Declan Kirrane

Founder and Managing Director of ISC Intelligence in Science

Declan Kirrane is the founder and Managing Director of ISC Intelligence in Science, a specialized science, technology and R&D public affairs firm based in Brussels, Belgium. ISC develops and implements Strategic Research Agendas for science and technology-based organisations in the EU and US. He has more than 25 years of experience disseminating scientific and research activities in Europe and worldwide from organizations and governments.

His expertise covers ICT, Health, Defence, Space, Science Policy, GPRD legislation, EU R&D and Innovation policies, programmes and funding instruments. He is closely involved in EU-Africa science and innovation relations and investments, particularly the EU’s investment strategy for Africa.

Water-Smart Society

by Durk Krol

Executive Director of the Water Europe

Durk Krol is the Executive Director of the Water Europe. He has worked in the water sector at the European level for the last 20 years, initially as a Senior Legal Policy Officer for the water department of provincial government of Friesland (NL), and as Deputy Secretary General at EUREAU. During his time at EUREAU he became involved in Water Europe, initially as Board member and since 2011 in his current position.

He has also closely been involved in the creation of the MEP Water Group in the European Parliament. Durk is a graduate of law, with an additional Master's degree in Latin American studies, and an MBA.

He has also completed the Executive Development Programme at Vlerick Business School, an Executive Master in International Association Management at Solvay Brussels School, and the Programme on Negotiation Global Online at Harvard Law School.



Hydropower – Sustainability, Security of Supply and System Stability

by Andreas Kunsch

Advisor to the Chief Operation Officer of VERBUND AG

Andreas Kunsch is currently advisor to the Chief Operation Officer of VERBUND AG – Austria's leading electricity company and one of the largest producers of electricity from hydropower in Europe. He has been with VERBUND for over 15 years, including more than 10 years in a variety of positions and areas at VERBUND hydropower.

Since autumn 2017 he is assistant to the member of the management board responsible for generation, digitization, IT and sustainability, where he also represents VERBUND in various committees strategy for Africa.





Integrated Approaches To Address the Sanitation Crisis in Unsewered Slum Areas In African Mega-Cities

by Piet Lens

Professor of New Energy Technologies at National University Ireland Galway

Prof. Dr. ir. Lens is established professor of New Energy Technologies at National University Ireland Galway (Ireland). He is also Adjunct Professor Environmental Biotechnology at IHE Delft (the Netherlands) and Tampere University (Finland). Besides innovative research, he is also a leader in education and capacity-building, organising numerous study-days, conferences, summer schools and short courses. He has (co-)authored over 700 scientific publications and edited eleven book volumes, of which 4 are translated in Chinese.



Water and Sustainable Agrifood Systems **by Antonia Lorenzo**

Specialist in Environmental Engineering and Technology

Antonia Lorenzo is Bachelor of Agricultural Chemistry and specialist in Environmental Engineering and Technology, and currently doing her PhD in Economic evaluation of the use of reclaimed water in agriculture at the University of Córdoba, Spain. Antonia is founder, CEO and R&D director at BIOAZUL. She has worked for more than 20 years in the management and implementation of more than 60 national and international projects, mainly related to blue infrastructures for the sustainable water management - treatment, water reuse, ecological sanitation, nature-based solutions – as well as circular economy and resources sustainability. She works for the European Commission as an external expert and evaluator in several of its programs. Since 2018 Antonia leads the Working Group of Water Europe on Water & Sustainable Agrifood Systems. Antonia is member of the Spanish Management Committee of the Circular City COST Action, and also the president of the Spanish “Nature-based solution Cluster” established in the city of Málaga in 2018. Finally, she is member of the Governing Council of the Andalusian Knowledge Agency

Antonia is also a mentor for the EIT Food Accelerator Network, the Cajamar Innova Incubator and has recently been selected as a mentor in the European Commission’s “EIC Women Leadership Program”.



How To Maximise the Recovery of Groundwater Treatment Plants **by Rudolf Ochsner**

UNIHA Wassertechnologie GmbH

Rudolf Ochsner attended the HTL Mechanical Engineering Linz (Ing.) and studied Economics and Social Sciences (lic. oec. HSG) at University of St. Gallen

He then spent 8 years at Ochsner GmbH & Co KG (plant manager, purchasing, authorized signatory) while later he became commercial assistant to the board of directors with statutory authority at Krems Chemie AG (organization of leveraged buy outs, IPO, company acquisitions).

Rudolf Ochsner joined UNIHA Wassertechnologie GmbH in 1981, finally taking over 53% of the shares in 2013 and is to this date running it at the company headquarters in Linz, based in the former office building of the Ochsner pump factory. UNIHA operates internationally with 100% export share and plans, builds and supplies turnkey water treatment plants for towns, villages and industries.



Water and Public Health **by Leonard Oste**

Chair of the working group 'Zero Pollution' of Water Europe.

Dr. Leonard Osté has over 20 years of experience in soil, sediment, and surface water quality. He is an expert in risk assessment and remediation of contaminated sediments and surface waters and has done a lot of work in developing legislation and guidelines.

He was involved in the development of Dutch standards for reuse of sediment and he was a member of the drafting group for an EU guidance on bioavailability of metals. In recent years, he has focused more on contaminants of emerging concern with a specific interest in the occurrence of PFAS in different compartments. He was involved in prioritization studies on a national and European level trying to select the most urgent compounds out of thousands of chemicals.

He is the chair of the working group 'Zero Pollution' of Water Europe. It is one of the technology platforms advising the European Commission on the Research and Innovation needs. He is also a member of the NORMAN working group on prioritisation of emerging compounds.



**Living Water - Source of Health -
Water Is Life - Water Heals!
by Johannes Pfaffenhuemer**

Managing director of Water of Life GmbH

Doctorate in business administration, managing director of Water of Life GmbH, expert for holistic health promotion, vital practice in Vogelparadies am Inn, board member of European Global Water Forum, board member of Quellen des Lebens e.V. (Source of Life) Germany / Munich, board member of Austrian Society for Health Promotion / Vienna



**Water-Oriented Living Labs
by Andrea Rubini**

Andrea Rubini is a water resource engineer with more than 35 years of experience in the water sector, in climate change and related impact on urban, industrial and rural ecosystems. He has been serving as the Director of Operations at Water Europe, the European water Technology Platform that was set up by the EC to promote water related RTD and innovation in Europe, since September 2016. Andrea has also previously worked as a Policy Advisor to the EC on Smart and Sustainable Growth, for the AfDB, ILO, and UNDP.

Global water security challenges and solutions

- **Water availability and the inevitability/ importance of water reuse**
- **Water quality challenges related to PMT (Persistent, Mobile and Toxic) substances**
- **Digital water transformation of water services**

by Dragan Savic

Chief Science Officer of KWR

Dragan Savić is Chief Executive Officer at KWR Water based in the Netherlands and Professor of Hydroinformatics at the University of Exeter in the UK.

Professor Savić is an international expert in smart water systems with over 35 years of experience working in engineering, academia and research consultancy. His work has resulted in patentable innovation and spinout companies. In addition to innovation and leadership skills, he is known for believing in and practising «bridging science and practice» in the wider water sector and utilities in general.



Potentials for Energy-Gaining of Water And Wastewater Treatment Plants

by Josef Schnaitl

Gisaqua GmbH

Beside leading major Project Organisations an important activity was the advice and support of governmental authorities in their efforts for implementation of their Waterinfrastructure programs considering all kinds of state of the art technologies (in Waste Water Activated Sludge-, SBR-, MBR-, Moving Bed- and Biofiltration, Thermal versus RO Desalination etc)

Based on the education as an electrical engineer a dignified experience in a wide range of aspects "in Water" has been gained during more than 40 years of business in relation to the Water Market.



Water Cooperation Through an International Perspective by David Smith

Chair of the International Water Relations (Water Beyond Europe);

David Smith is the director of the consulting company, Water, Environment and Business for Development. He has a Bachelor's degree in Botany and Zoology (2000) and an Honors Degree in Limnology (2001) from the University of Cape Town (RSA).

He has a Masters Degree in Water and Environmental Management from Loughborough University (UK) (2015) and is currently a PhD candidate at the Autonomous University of Barcelona in Environmental Science and Technology.

David has led more than 25 projects on environmental studies across the globe. His expertise in economic and social development is focused on environmental management, integrated water resource management, Green Growth, environmental business models, ecosystem services, stakeholder participation and engagement strategies, climate change adaptation and mitigation and capacity development.



Economic and Social Challenges for SMEs In the Drinking Water Industry by Bernhard Schnederle

Head of Business Development at UNIHA Wasser Technologie GmbH

Bernhard Schnederle MSc MBA is currently acting as Head of Business Development at UNIHA Wasser Technologie, an internationally renowned Austrian systems integrator and contractor for Ground & Surface Water, Sea & Brackish Water, and Industrial Water Treatment.

His academic journey across Austria, Canada, the UK and Taiwan and various water projects in Southeast Asia and Sub-Saharan Africa have shaped him as experienced professional in doing business in intercultural contexts. He has obtained an MSc in Global Business from JKU Linz (Austria) and an MBA in International Business from NSYSU (Taiwan), and maintains close relations to academics.



**The Human Factor –
Becoming a More Diverse, Holistic and
Integrated Water Community
by Naomi Timmer**

Director of H2O-People

Naomi Timmer is director of H2O-People and its' Flagship Programme the European Junior Water Programme (EJWP).

Naomi have been active for almost 10 years in the water management sector as a programme manager for several personal development programmes in the Dutch water sector. Since 2019 she is creator and director of EJWP to share the knowledge and enthusiasm of a holistic leadership approach within an European context.

Naomi has a Master in political science and a Bachelor's degree in religious studies, she specialized in Religion and Violence, power structures and public affairs.

She always thought she accidentally turned up into the water sector until she heard Kofi Annan at Making Waves (7 September 2017)

and see the interlinkage of water, culture, and human behaviour and the need for a more holistic approach in the water sector. To create more empowerment and social grounded transformations..

**Sustainable Management and Reuse of
Stormwater in a Changing Climate
by Tone Merete Muthanna**

Professor and head of the Water and Wastewater research group at the Norwegian University of Science and Technology (NTNU)

Tone Merete Muthanna is a professor and head of the Water and Wastewater research group in the Department of Civil and Environmental Engineering at the Norwegian University of Science and Technology (NTNU).

Her main research focus area is urban hydrology and stormwater water management. In Water Europe she heads the working group on Water and Climate structures and public affairs.





**Water Data Space:
Challenges and Opportunities
by Eloisa Vargiu**

Cetaqua Water Technology Centre

Eloisa Vargiu holds a Ph.D. degree in Electronic and Computer Engineering by the University of Cagliari (Italy). Currently, she is working at Cetaqua, Water Technology Centre, as specialist in public funding, collaborating to the research in the field of Water 4.0.

She is also the leader of the Working Group on Water & Digital Systems for Water Europe. In 2002, she obtained the accreditation as associate professor from Quality Agency of the University system (AQU), Generalitat de Catalunya and, in 2020, the accreditation as associate professor from the Ministry of Instruction and University in Italy.

From 2013 to 2020, she managed the Integrated Care research line at the eHealth R&D Unit, Eurecat Centre Tecnològic de Catalunya.

From April 2016 to December 2019, she was the technical coordination of the EU project CONNECARE (H2O2O) that was evaluated as «outstanding» by the EC. From January 2012 to June 2015, she was the technical coordinator and main researcher of the EU project.

She was also the technical coordinator from Eurecat of several Spanish projects. During her Ph.D., she studied the pro-active and adaptive behaviour of agents and she developed a hierarchical agent architecture. In the same period, she collaborated with the CRS4, an interdisciplinary research centre located in Sardinia. During her 4-years post-doc activity, she worked on different projects on bioinformatics and information retrieval.

In total, she collaborated more than 10 years with the Intelligent Agents and Soft-Computing (IASC) group at the Department of Electrical and Electronic Engineering (DIEE), of Cagliari. She is co-author of more than 100 peer-reviewed publications in international journals and conferences, as well as co-editor of 4 research books.



**The Role of Advanced Oxidation
For the Production of Re-Use Water
by Konrad Wutscher**

Konrad Falko Wutscher is a senior consultant for process technology for physical – chemical - biological treatment of water and wastewater of any nature and origin. He has been involved in significant projects both as a consultant and a technology provider. Country experience not only includes Europe but many regions worldwide where water re-use and pollution control becoming of major importance.



