



Interdisciplinary Junior Summit
Water: Unite and Divide

**Interdisciplinary approaches for a sustainable
future**

Programme Booklet

About the European Science Foundation

The European Science Foundation (ESF) is an independent, non-governmental organisation, the members of which are 72 national funding agencies, research performing agencies and academies from 30 countries.

The strength of ESF lies in its influential membership and in its ability to bring together the different domains of European science in order to meet the challenges of the future.

Since its establishment in 1974, ESF, which has its headquarters in Strasbourg with offices in Brussels and Ostend, has assembled a host of organisations that span all disciplines of science, to create a common platform for cross-border cooperation in Europe.

ESF is dedicated to promoting collaboration in scientific research and in funding of research and science policy across Europe. Through its activities and instruments, ESF has made major contributions to science in a global context. ESF covers the following scientific domains:

- Humanities
- Life, Earth and Environmental Sciences
- Medical Sciences
- Physical and Engineering Sciences
- Social Sciences
- Marine Sciences
- Materials Science and Engineering
- Nuclear Physics
- Polar Sciences
- Radio Astronomy
- Space Sciences

www.esf.org

About the Interdisciplinary Junior Summit

The Interdisciplinary Junior Summit 'Water: Unite and Divide. Interdisciplinary approaches for a sustainable future' is an initiative supported by four of the ESF Standing Committees: those covering the Humanities; the Life, Earth and Environmental Sciences; the Physical and Engineering Sciences; and the Social Sciences.

The main objective of the Summit is to invite the next generation of leading scientists ('early career researchers') across the academic spectrum to participate in a four-day, in-depth discussion of the challenges and opportunities posed by inter (multi, trans) disciplinary research. Discussions will be fuelled by world-class experts from very different academic backgrounds.

Discussions may focus on various issues related to the event's general theme of "Water: Unite and Divide. Interdisciplinary approaches for a sustainable future". An important restriction though is that the Summit will focus on fresh water. Examples – to be taken in a global context – include, but are not limited to, the following: water management and governance; the value of water; and climate change and adaptation.

Programme Committee

Chair: Professor Milena Žic-Fuchs

University of Zagreb and chair of the Standing Committee for the Humanities (SCH)

Professor Mats Gyllenberg

University of Helsinki and chair of the Standing Committee for Physical and Engineering Sciences (PESC)

Professor Pieter Hooimeijer

Utrecht University and member of the Standing Committee for the Social Sciences (SCSS)

Dr Aslihan Kerç

Marmara University and member of the Standing Committee for the Life, Earth and Environmental Sciences (LESC)

Dr Tatiana Kluvankova-Oravska

Slovak Academy of Sciences and SCSS member

Professor Gisli Palsson

University of Iceland and former SCH member

Professor Hanne Ruus

University of Copenhagen and SCH member

Professor Matti Sintonen

University of Helsinki and SCH member

Dr Theodoros I. Zachariadis

Cyprus University of Technology and LESK member

ESF office

Dr Eva Hoogland, *Senior Science Officer*

Mr Etienne Franchineau, *Junior Science Officer*

Ms Claire Rustat-Flinton, *Administrator*

Programme

Sunday 26 August

Arrival & Welcome dinner (20:00)

Monday 27 August

Opening session

Session Chair: Matti Sintonen

09:00 Welcome
Milena Zic-Fuchs (Chair Programme Committee)

Introduction to the ESF and our activities
Eva Hoogland (ESF)

Introductory session 1

09:30 Introductory lecture – ‘The End of Disciplinarity’
Robert Frodeman

10:30 Q&A

11:00 *Break*

11:30 Introductory lecture – on the methodology of Mathematical Modelling
Mats Gyllenberg

12:30 Q&A

13:00 *Lunch*

Thematic session 1a: Water management and governance

Dialogues: Conflicts and cooperation

Session Chair: Tatiana Kluvankova-Oravska

Short Talks 1

Water management: conflicts and cooperation

15:00	David Benson	Arun Rana
	Katerina Charalambous	Josselin Rouillard
	Leonith Hinojosa-Valencia	Darío Salinas Palacios
	Mine Islar	Cheng Wen
	Yoseph Negusse Araya	Anas Zyadin
	Anna Radványi	

17:00 *Break*

17:30 Invited presentation - Water management and governance. Dialogues: conflicts and cooperation
Verena Winiwarter

18:30 Q&A

20:00 *Dinner*

Tuesday 28 August

Thematic session 1b: Water management and governance
Water quality and Public Health

Session Chair: Aslihan Kerc

09:00 Invited presentation 1 - Interdisciplinary reframing of the challenge to regulate endocrine disrupting chemicals in wastewater
Janne Hukkinen

10:00 Q&A

10:30 *Break*

11:00 Invited presentation 2 - Solving water problems of a metropolis
Ahmet Saatci

12:00 Q&A

12:30 *Lunch*

Short Talks 2
Water management: quality and health

14:30	Agathoklis Agathokleous	Resty Naiga
	Gary Bilotta	Gül Özerol
	Helen Bridle	Stephanie Palmer
	Florence Bullough	Syam Sundar Andra
	Viachaslau Filimonau	Anton Vrieling
	Ioana Meleg	Laura Woltersdorf

16:30 *Break*

Introductory session 2
Session Chair: Hanne Ruus

17:00 Introductory Lecture – What is Water? (an answer from a chemist)
Knut J. Børve

18:00 Q&A

Short Talks 3
Flood and scarcity

18:30	Maria Bostenaru Dan	Klara Nedvedova
	Lina Eklund	

20:00 *Dinner*

Thematic session 2: The value of water

Session Chair: Theodoros Zachariadis

09:00 Invited Presentation 1 - The value of water: Strengths and weaknesses of the Economic perspective
Michael Hanemann

10:00 Q&A

10:30 *Break*

11:00 Invited Presentation 2 - The value of water: An Anthropological perspective on the configuration of social worlds
Kirsten Hastrup

12:00 Q&A

Short Talks 4
The value of water

12:30 Jernej Letnar Cernic
Anna G. Piotrowska

Joško Sindik

13:00 *Lunch*

Discussion session 1
Session Chair: Milena Zic-Fuchs

15:00 Discussion paper - Radical Inter- and Transdisciplinarity – why do we need it and how may it be done?
Poul Holm

16:00 Q&A

16:30 *Break*

17:00 *Discussions in break-out groups*

18:00 *Re-convening in the plenary: (tentative) conclusions*

Short Talks 5
Interdisciplinarity

18:30 Monica Cardillo
Cecilia Fenech

Zena Kamash

20:00 *Dinner*

Thursday 30 August

Thematic session 3: Climate change and Adaptation

Session Chair: Theodoros Zachariadis

- 09:00 Surprise session
- 10:30 *Break*
- 11:00 Invited presentation: Adaptation as a policy challenge – Institutions and Science
David Feldman
- 12:00 Q&A

Short Talks 6 Water and climate change

- 12:30 Animesh Gain Christos Zoumides
Silja Klepp
- 13:00 *Lunch*

Discussion session 2 Session Chair: Eva Hoogland

- 15:00 Discussion paper
Kristina Ferkovic (Eurodoc)
- 15:20 Q&A
- 15:30 *Discussions in break-out groups*
- 16:30 *Re-convening in the plenary: (tentative) conclusions*
- 17:00 *Break*

Closing session Session Chair: Milena Zic-Fuchs

- 17:30 Closing discussion
- 18:30 Conclusions
Milena Zic-Fuchs
- 20:00 *Dinner*

Friday 31 August

Breakfast & Departure

Invited speakers



Prof Knut J. Børve
University of Bergen, Norway

Knut J. Børve is a professor of chemistry at the University of Bergen, Norway. He graduated with a PhD in quantum chemistry in 1991 and has later taken up experimental studies by means of electron spectroscopy. Present research topics include the structure and properties of nanodroplets and photoelectron spectroscopy. Børve is presently leading the educational program in nanoscience at his university.

What is water? An answer from a chemist

The presentation will start by providing daily-life examples of processes where water plays the leading part and showing how these processes are intimately connected to the basic physiochemical and chemical properties of water. Next, working from a paradigm of structure-activity relationships, the structure of water is considered both at the intramolecular and intermolecular level. This implies characterizing the bonding in and between water molecules. Particular attention is paid to the structure of liquid water, as this is currently subject to considerable controversy and a very active field of research. Finally, different approaches to purification of water will be discussed and compared.



Ms Kristina Ferkovic
EURODOC representative

Since 2008, I am attending doctorate study at the University of Zagreb, Croatia, on the Faculty of Electrical Engineering and Computing with specialization in „Real, reactive and apparent power measurements on low frequency“. One of my main duties is active participation in lectures for undergraduate students for various courses: Introduction to measurement, Measurement technique, Theory of measurement and Quality management.

From 2006 until 2008 I was employed by Siemens as a software developer.

During my 4th and 5th year of my undergraduate study I was awarded with a student scholarship from University of Zagreb

At the ESF Junior Summit, Kristina Ferkovic is representing EURODOC: the European Council of Doctoral Candidates and Junior Researchers.

About EURODOC

EURODOC is the European Council of Doctoral Candidates and Junior Researchers. It is an international federation of 35 national organisations of PhD candidates, and more generally of young researchers from 34 countries of the European Union and the Council of Europe.

EURODOC's objectives are:

- To represent doctoral candidates and junior researchers at the European level in matters of education, research, and professional development of their careers.
- To advance the quality of doctoral programmes and the standards of research activity in Europe.
- To promote the circulation of information on issues regarding young researchers; organize events, take part in debates and assist in the elaboration of policies about Higher Education and Research in Europe.
- To establish and promote co-operation between national associations representing doctoral candidates and junior researchers within Europe.

EURODOC was founded in 2002, in Girona (Spain). Since 2005, Eurodoc has its seat in Brussels, Belgium.



Prof David Feldman

University of California, United States

David L. Feldman (Ph.D., University of Missouri, 1979) is Professor and Chair of the Department of Planning, Policy & Design at the School of Social Ecology, University of California, Irvine. He is also Professor of Political Science. Feldman specializes in water resources management, global climate change policy, ethics and environmental decision-making, and adaptive management. His research is focused on the sources of value conflicts over allocation of water. He served as a lead author for a 2008 U.S. Climate Change Science Program report on climate variability and water and as editor of *The Review of Policy Research*. Among his publications, he is author of *Water* (Polity, 2012), *The Politics of Environmental Policy in Russia* (Elgar, 2012), *The Geopolitics of Natural Resources* (Elgar, 2011), *Water Policy for Sustainable Development* (Hopkins, 2007), *Water Resources Management: In Search of an Environmental Ethic* (Hopkins, 1995), *The Energy Crisis: Unresolved Issues and Enduring Legacies* (Hopkins, 1996), *Global Climate Change and Public Policy* (Wadsworth, 1994) and nearly 80 articles and book chapters.

Adaptation as a policy challenge – Institutions and Science

Adaptation is the pursuit of active measures to enhance humankind's capacity to manage water supply and attenuate demand in the face of climate uncertainty. It requires imaginative management and the translation and co-production of climate knowledge. We analyze the need for adaptation, adaptation approaches, and the role of knowledge co-production in adaptation.

Scientists point to worsening conditions for freshwater as a result of climate change. Regions already experiencing periodic drought or flood are likely to see worse drought and flooding in the future. Active measures are policy responses that modify existing management strategies, principally in three venues: megacities; large basins; and, globally. Megacities generally rely on diversion of distant water sources. The experience of Los Angeles, Mexico City, Mumbai, New York, Tokyo, and elsewhere show how climate adaptation can be achieved through conservation and end-use efficiency, conjunctive use, and storm-water and wastewater re-use – as well as the challenges in doing so.

Basin-wide adaptation measures are products of negotiation among users, managers and scientists and typically utilize public education and outreach, diverse

problem solving strategies, and local capacity-building approaches. Examples include Nigeria's Hadejia-Jama'are Joint-Wetlands Livelihood, Australia's Murray-Darling basin and Bangladesh's delta management efforts. Global measures revolve around informal networks that rely on soft power– convincing protagonists to emulate certain values and attitudes embedded such as local sustainability and decentralized governance. Examples include UNCED's Local Agenda 21 Program, the UN Millennium Development Summit (2000), the World Civil Society Forum (2002), and the UNEP Foresight Process on Emerging Environmental issues (2012). These efforts seek alignment between governance institutions, water problems, and climate change through integrating water infrastructure, energy, and land use decision-making.

Co-production seeks to develop knowledge networks to bridge the gap between knowledge and action needed for adaptation by linking policy-makers, scientists, and NGOs. Examples of such networks include Regional Integrated Sciences and Assessments (U.S.), Brazil's Ceará province management scheme, and the Nile Basin Initiative (Africa).

Global climate change necessitates adapting to freshwater shortages and alterations in distribution. Adaptation requires better communication between climate information producers and end-users, and the reform of water institutions. Impediments include antiquated models of science-for-policy which predicate that scientists prepare models, products, forecasts or other without understanding user needs. Adaptive management – an approach emphasizing learning from previous mistakes – can overcome these obstacles.



Prof Robert Frodeman

University of North Texas, United States

Robert Frodeman is Director of the Center for the Study of Interdisciplinarity and Professor of Philosophy in the Department of Philosophy and Religion Studies at the University of North Texas. He specializes in environmental philosophy, science policy, and questions concerning interdisciplinarity. Holder of advanced degrees in philosophy (a PhD, from Penn State) and geology (a masters from the University of Colorado), he has held positions at the University of Texas, the University of Tennessee, and the University of Colorado. He served as a consultant for the US Geological Survey for eight years, was the 2001-2002 Hennebach Professor of the Humanities at the Colorado School of Mines, and was an ESRC Fellow at Lancaster University in England in the spring of 2005. Robert Frodeman is Editor in Chief of the Oxford Handbook of Interdisciplinarity.

I conclude with some suggestions on how early career researchers can best position themselves for the post-disciplinary age.

'The End of Disciplinarity'

We live in a distinctive historical moment – the end of the era of disciplinarity. This presentation explores the implications of the closure of this era.

The end of disciplinarity does not mean the end of disciplines, which will continue to be central to the academic enterprise for a variety of practical and institutional reasons. But I do claim that disciplinarity will no longer function as the end or goal of academic research. Disciplinarity was sufficient for a certain historical period, now coming to an end with the dawning of the neoliberal university.

This presentation consists of two parts. The first offers an account of the characteristics of the disciplinary era of knowledge, and provide a set of reasons for thinking that this era is concluding. The second provides an account of what are the likely to be the imperatives facing researchers in a new, inter- and transdisciplinary age of knowledge production. In the second part I develop 4 theses:

- Interdisciplinarity is complementary to rather than antagonistic with disciplinarity
- Interdisciplinarity is a placeholder, not a method
- The post-disciplinary university presents the humanities with an opportunity to reinvent themselves as a central element of research and education
- In the 21st century academy, intellectual autonomy should be framed as the dialectical partner of public accountability



Prof Mats Gyllenberg

University of Helsinki, Finland

Mats Gyllenberg is Professor, and Doctor of Technology, at the Department of Mathematics and Statistics at the University of Helsinki.

He is Head of the Research Group of Biomathematics at the University of Helsinki that focuses on mathematical modelling and analysis of biological phenomena and processes. The research covers a wide spectrum of topics ranging from problems at the molecular level to the structure of populations. To tackle these problems, Gyllenberg and his team use a variety of modelling approaches, most importantly ordinary and partial differential equations, integral equations and stochastic processes. Gyllenberg is especially interested in structured population dynamics with applications to ecology and evolution, adaptive dynamics, physiological models and mathematical taxonomy.

Mats Gyllenberg is editor-in-chief of the *Journal of Mathematical Biology*, Editor of the *Journal of Biological Dynamics* and of the *International journal of biomathematics* and President of the Finnish Mathematical Society.

Abstract will be provided later



Prof Michael Hanemann

Arizona State University, United States

W. Michael Hanemann is a Professor of Economics at Arizona State University and a research professor in the Department of Agricultural and Resource Economics at the University of California, Berkeley. He is a member of the US National Academy of Sciences. He has worked on non-market valuation, and the economics of water and of climate change, and is a contributing lead author to the IPCC Fifth Assessment Report on climate change. He has consulted with governmental agencies on water management issues in the US and Europe. He served as the economics staff for California's state water rights agency during some of its contentious adjudications on water allocation and as its economic consultant in 1992-1993 for its Mono Lake Decision. He co-edited *Urban Water Management* (McGraw Hill, 1998) and is co-author of the chapter on "Water and Sanitation," in Bjorn Lomborg (ed.) *Global Crises, Global Solutions: Costs and Benefits* Second Edition, Cambridge University Press (2009). His work has appeared in *AER*, *Econometrica*, *the Review of Economics and Statistics*, *JEEM*, *AJAE*, and elsewhere.

Professor Hanemann has a BA in Philosophy Politics and Economics from Oxford University, an M.Sc (Econ) in Economics from the London School of Economics, and a Ph.D in Economics from Harvard University. He received an honorary Ph.D from the Swedish University of Agricultural Sciences and the Lifetime Award for Outstanding Achievement from the European Association of Environmental & Resource Economists. He is an inaugural Fellow of the Association of Environmental and Resource Economists and a Fellow of the American Association of Agricultural Economics.

The Value of Water: Strengths and Weaknesses of the Economic Perspective

The economic analysis of water has been a well-established academic topic for more than 50 years. The economic approach has certain strengths, including a relatively clear-sighted focus on the benefits and costs of alternative water-related actions (including opportunity costs), a focus on the behavior of the individual actors and groups of actors, and an awareness of the significance of issues such as time discounting and externalities. However, the economic approach, as conventionally implemented, also has some significant blind spots. These include a relentless focus on optimization without regard to distributional issues, a common tendency to amortize all capital costs as though

financing was effortlessly available, and a general disregard for the distinctive, physical, legal and symbolic features of water that make it economically different from other commodities. For reasons to be explained, water is a typically a much more difficult commodity to allocate and re-allocate than most other commodities, yet these are typically overlooked in many economic analyses. These features explain the dominant role of institutional considerations and governance arrangements in the provision of water supply and the valuation of water.



Prof Kirsten Hastrup

University of Copenhagen, Denmark

Kirsten Hastrup is professor of Anthropology at the University of Copenhagen. She has done substantial research on Icelandic history and society that spans the entire history of the island society and traces the intricate links between environmental changes and historical and social developments. In addition, she has published critical explorations of the philosophical and epistemological foundations of anthropology and general introductions to the history of the human sciences and their contributions to society.

Kirsten Hastrup is leader of the Waterworlds project, a five-year project funded by the ERC that aims to study local, social responses to environmental disasters related to water, as spurred by the melting of ice in the Arctic and in mountainous glacier areas, the rising of seas that flood islands and coastal communities across the globe, and the drying of lands accelerating desertification in large parts of Africa and elsewhere. The ambition is to contribute to a renewed theory of social resilience that builds on the actualities of social life in distinct localities, thus focussing on human agency as the basis for people's quest for certainty in exposed environments.

The Value of Water: An Anthropological Perspective on the Configuration of Social Worlds

In this presentation, the value of water will be addressed from the perspective of the social sciences, and more specifically of anthropology. From that perspective, water is not only the sine qua non of life in general, it is also seen to configure societies in particular ways, and to generate particular values.

Water comes in many kinds when seen from the point of view of humans: ice, snow, seas, waves, rain, rivers, floods, swamps, wellsprings, ground water, dew, steam – each of which enables particular social forms, and prohibit others. Once established, excess or shortage of any kind of water potentially threatens society; there is thus a balance to maintain, for a particular kind of society to continue.

This takes us to another point about water, namely its agentive powers; water does something in society: It gives life, it inundates, it floods, it obliterates and it creates value. When it comes to value, it is not only a matter of economic but also moral value, configured in extensive patterns of sharing and distributing water resources within a community. This gradually makes us realize that water also has deep imaginative implications; it carries people's thoughts towards other shores, farther

horizons, deeper meanings and existential questions.

On the basis of such basic identification of the ways in which water contributes to the making of societies, big or small, a couple of cases relating to different kinds and powers of water will be analysed in more depth. The first case will be that of rivers, creating their own transformative system of values as the river flows and bends. The second case will be that of wells, centring communities on particular sources of water, and sometimes creating major tensions between them. Thirdly, a case relating to the sea will be discussed, and it will be shown how a particular social form is made out of the conjunction of water, animals and people.

The general message is that water is a powerful resource, not only for survival and production but also, and as significantly, for the configuring of particular social forms and social values.



Prof Poul Holm

Trinity College Dublin, Ireland

Poul Holm is Trinity Long Room Hub Professor of Humanities at Trinity College Dublin. He has been a Senior Curator at the Fisheries and Maritime Museum, Esbjerg, Denmark; Professor at the University of Southern Denmark; Rector (President) of the University of Roskilde; and chairman of the Danish Research Council for the Humanities. He is former President of the European Society for Environmental History (2004-2007). Trained as a medieval historian, most of his work has been in interdisciplinary fields. He has published on fisheries history and marine environmental history; coastal communities and culture; and the Viking settlements in Ireland. Poul Holm is currently chair of the global History of Marine Animal Populations project, HMAP, which is a 10-year project aiming to understand human impacts on ocean ecology.

The RITE framework when applied helps enable research in grand research questions such as:

- How can we explain variation in resource use?
- What explains different societies' willingness and ability to mitigate and adapt to the consequences of environmental change?
- What factors -political, institutional, social, cultural, cognitive -shape the implementation and use of different sources of renewable energy?
- What unintended consequences do policies implemented to address grand challenges have on society?
- How can research projects actively contribute to societal transformation processes?

Radical Inter- and Transdisciplinarity – why do we need it and how may it be done?

I open my talk with a personal narrative of my journey as a medieval historian into broader concerns of environmental change, the challenges of dialogue across disciplinary divides, and the translational problems of engaging with citizens, customers and politicians. I shall offer some examples of how my own curiosity has led me to wonderful discoveries and academic nightmares. Currently, my own challenge is to understand cultural and philosophical divides and how they may be turned into arenas of fruitful collaboration.

I shall argue that the concept of Radically Inter- and Transdisciplinary Environments (RITE) offers a framework to help bridge the gaps between knowledge and action and link the past with the future. Second, RITE gives greater attention to biogeophysical dimensions in social sciences, to cultural narratives and humanities views in ecology, and to ecological and technical approaches to humanistic studies. Third, it delivers a strongly defined set of concepts, theory and research goals to shape pan-European (as opposed to merely national) research. Fourth, it promotes the active and practical connection of academic and scientific communities with civil, commercial and political society. Fifth, radical interdisciplinary research can inform and steer policy makers in an overarching way (instead of informing on very specific scientific questions). Finally, it forms a link between long-term historical and current environmental understandings of landscape as the basis for robust future-looking scenarios.



Prof Janne Hukkinen
University of Helsinki, Finland

Janne Hukkinen (PhD, University of California, Berkeley, 1990) is professor of environmental policy at the University of Helsinki, a joint position with Faculty of Social Sciences, Faculty of Biological and Environmental Sciences and Faculty of Agriculture and Forestry. He is especially interested in cognitive aspects of sustainability assessment and strategy, with empirical applications. He has longstanding expertise in environmental and technology policy and participated in projects concerning, among others, long-term waste management and environmentally sound product concepts, water policy in arid areas, and environmental governance in northern regions. His publications - Over 60 peer-reviewed scientific articles or book chapters - include: *Sustainability Networks: Cognitive Tools for Expert Collaboration in Social-Ecological Systems* (Routledge, London, 2008) and *Promoting Interdisciplinary Research: The Case of the Academy of Finland* (Academy of Finland, Helsinki, 2005). Janne Hukkinen is a board member of the European Society for Ecological Economics, Expert Counsellor on the Environment, Supreme Administrative Court of Finland and a member of the Advisory Group of the EC 7th Framework Programme on Environment and Climate.

Interdisciplinary reframing of the challenge to regulate endocrine disrupting chemicals in wastewater

In an influential defense of the scientific soundness of the precautionary principle, Stirling and Gee (2002) caution against over-extending the application of risk assessment on one hand, and paralyzing technological innovation on the other, in environmental issues characterized by uncertainty, ambiguity or ignorance. As a scientifically robust way forward, they outline principles for a precautionary approach to environmental regulation, including humility over science, completeness of regulatory scope, attention to pros and cons, consideration of a range of alternatives, involving diverse disciplines and perspectives, and emphasis on research and monitoring. What Stirling and Gee leave open are the details of the regulatory design that implements the principles of precaution.

This paper discusses the implementation of the principles of precaution in the incipient design of a regulatory approach to endocrine disrupting chemicals (EDCs) found in the wastewater effluent of the city of Helsinki, Finland. The objective of the paper is to outline a methodology for

re-framing the complex problem of emerging water pollutants characterized by environmental and public health uncertainties, ambiguities and ignorance into a more tractable one for environmental regulation. The paper describes the organizational and cognitive dimensions of interdisciplinary knowledge integration during problem reframing. The data come from chemical analyses of EDCs in the city of Helsinki wastewater effluent and workshops organized with key stakeholders of EDC governance in Finland. The work is in progress and its results are tentative.

Preliminary results of the knowledge integration exercise indicate that the regulatory solution space has two dimensions: an infrastructural one and a rhythmic one. First, workshop discussions and chemical and toxicological literature on EDCs indicate that the steroidal compounds that were the focus of this study are only a small part of the overall EDC complex. Yet chemical analyses at the Helsinki plant show that steroids alone are made of a suite of different compounds that undergo complex reactions in the treatment process. This suggests that EDC regulation would benefit from analogies to regulatory regimes beyond chemical risk regulation. The complex networks of EDCs are akin to the complex technological infrastructures of modern society, whose regulation involves environmental impact assessment procedures that weigh the pros and cons of a range of alternatives. Second, workshop discussions and toxicological literature indicate that ecosystems are particularly susceptible to EDC impacts during the reproductively active springtime. This suggests a rhythmic regulatory regime that would limit the use of EDC containing products during ecologically sensitive periods identified in environmental research and monitoring.



Prof Ahmet Saatci
Marmara University, Turkey

Ahmet Saatci (PhD, Iowa State University, 1979) is professor of environmental engineering; he is the founder of Environmental Engineering Department in Marmara University, Turkey. With a broad research and teaching experience in water and waste water treatment technologies, plant design, computer applications, water chemistry and unit operations, he is well-known for environmental engineering as well as water governance. He has worked in the establishment of a new Sanitary Engineering Division in King Abdulaziz University, Saudi Arabia. Prof. Saatci served as a member of the Science Board in The Scientific and Technological Research Council of Turkey (TUBITAK) between 2005-2012. He is a member of Eureka-Acqueau Scientific Committee and observer in the Scientific Committee of the European Environmental Agency (EEA). He was the Vice Secretary General of the 5th World Water Forum that took place in Istanbul in March 2009. He is the founding president of the Turkish Water Institute (SUEN), founded in 2011.

Solving water problems of a metropolis

A Short History of Water Supply

Istanbul is a metropolis with a population of about 13 million (more than some European countries). Throughout history, the water supply to Istanbul has been a problem. During the Byzantium times, Emperor Hadrian (117-138) brought water from locations close to the castle walls; Emperor Valens (364-378) constructed two aqueducts. In the ancient city, water was stored in big underground reservoirs. During the Ottoman Empire, 16 waterways – of a total of 130 km and 33 aqueducts - supplied water to a population of 150-200 000 people. Water was brought using pressurized transmission lines in 1885 by a private company. The first Istanbul Water Administration was established in 1933.

Today, the Istanbul Water & Wastewater Administration (ISKI) supplies 2770000 m³ of drinking water every day. Water is treated in different treatment plants located on the Asian and European side of the city. Advanced water treatment techniques including ozonation and activated carbon are applied.

Water Supply from a Basin 190 km Away

Istanbul had severe water shortage till 1994. An ambitious project was started to bring water from the Melen basin which is 187 km east of Istanbul. The final capacity of the project is 1.80 million m³/d and it will cost 1.18 billion USD. The first phase of the project is completed and 268 million m³ of water is supplied.

Saving a Main Water Reservoir from Eutrophication

Migration is a social problem and as a consequence brings illegal settlement complications. Although, according to regulations, settlements around drinking water reservoirs are prohibited, squatters occupy vast areas within watershed zones and their wastewater becomes a threat to water resources. The Omerli reservoir, which has a capacity of 387 million m³, was polluted by shanty towns that started to grow on its watershed zone in 1990s. The reservoir started to reach an eutrophication stage hampering the water treatment process. A wastewater treatment plant was built to treat the wastewater reaching to the reservoir. Algae growth could be stopped but the decaying algae caused anaerobic conditions at the bottom of the reservoir causing iron and manganese in the bottom mud to dissolve into the water. Red water problem started and it could be solved after about a year of operation of the wastewater treatment plant. A second new treatment plant was constructed including filtration and UV disinfection units. The effluent is discharged to the Riva Creek and is used for irrigation.



Prof Verena Winiwarter

*Alpen-Adria-Universität Klagenfurt,
Austria*

Verena Winiwarter is professor for Environmental History at the Institute of Social Ecology, Faculty of Interdisciplinary Studies Vienna and

Dean of the Faculty of Interdisciplinary Studies at the Alpen-Adria-Universität Klagenfurt.

After obtaining a degree in technical chemistry, she worked for several years at Vienna's Technical University doing trace analysis of air pollutants. She then acquired a degree in medieval history and communication sciences, and a PhD in environmental history, and subsequently wrote her Habilitation in human ecology at Vienna University. Since 2003 she is head of the Centre for Environmental History of the Institute for Social Ecology in Vienna. Her numerous publications encompass themes from antiquity to the recent past, centred on agro-ecosystems and their history, with a special interest in the history of soils and conceptual issues of interdisciplinary work. She is the author, with Martin Knoll, of the first German textbook for environmental history, *Umweltgeschichte. Eine Einführung* (UTB Böhlau, 2007), and she is and co-founder and former president of the European Society for Environmental History

Water management and governance. Dialogues: conflicts and cooperation

Between 1890 and 1990, global water use increased nine fold, and again nine fold from 1900 to 2010. It came close to 4500 billion m³ per year in 2010. The vast majority of the Earth's water resources are salt water, only 2.5% being fresh water. Approximately 70% of the fresh water available on the planet is frozen in the ice caps of Antarctica and Greenland leaving the remaining 30% (equal to only 0.7% of total water resources worldwide) available for consumption. From this remaining 0.7%, roughly 87% is allocated to agricultural purposes (IPCC 2007).

Freshwater shortage, pollution, destruction of natural habitat and unsustainable exploitation of fisheries and other living resources under conditions of global change are the main areas of concern of IWHA, the Global International Water Assessment (2001). Rivers are dammed; seas are used as the ultimate sink for hazardous waste, glaciers melt. No wonder, then, that water management and governance have become issues of concern.

Resource-management institutions mediate the relationship between society and the environment to prevent or reduce socially and economically undesirable outcomes. Usually, these outcomes have to do with "waste" and "inefficiency" in resource use or in the investment of capital and labor. These resource regimes may take a variety of forms, the three most common archetypes being 1) private property institutions, unfettered by the state; 2) self-organized or common-property institutions; and 3) centralized state institutions. (Emel and Roberts, 1995)

When dealing with water, any such institution has to deal with dynamic ecosystems. Humans have increased their vulnerability to the natural dynamics of rivers substantially in the 20th century. Floods are always in conflict with floodplain development. No amount of structural protection will remove the risk of being damaged by flood flows and the mud and debris and pollution that accompanies them.

Can environmental history offer insights for a more sustainable use of water resources? The answer is a clear "yes". We shall review evidence for successful and unsuccessful management of water and wetlands from cases around the world. These include 20th century Tibet, 18th century Japan, Stalin's Soviet Union, the Danube, and Atlantic halibut fisheries in the 19th century. Three main insights emerge: The close connection between water and social power, the importance of legacies and the interconnectedness of water and terrestrial ecosystems. These key insights can and should inform the future governance of water.

Grantees



Mr Agathoklis Agathokleous

University of Cyprus, Cyprus

Agathoklis Agathokleous was born in Cyprus in 1980. He received a Technician Diploma in the field of Civil Engineering from Higher Technical Institute in 2001 and completed his undergraduate and graduate studies at the University of Surrey UK, from where he graduated in 2005 getting a MEng. Degree and 2006 getting a MSc. Degree in Structural Engineering. In 2007 he joined the Civil and Environmental Engineering Department of the University of Cyprus as a researcher and PhD candidate and since January 2012 Agathoklis is member of EUPALINOS Lab Research Team which is part of NIREAS Center (International Water Research Center).

Urban water distribution networks modelling and optimisation of leakage detection via wireless sensors

Water losses associated with inefficiencies of the water distribution system are causing revenue losses and affect the national water reserves negatively. Municipalities are working on finding ways to improve the monitoring and efficiency of their water distribution networks.

Presented herein is an overview of the results to-date of several inter-connected research projects relating to water distribution network management: 1) The output from site tests conducted on a water distribution system pilot model, 2) An optimal sensor placement application aiming the maximization of the cover area of a piping network with the least possible number of sensors, 3) An integrated mathematical model for the management of water distribution networks, 4) The effects of intermittent water supply on the vulnerability of urban water distribution networks, 5) A GIS-application for real-time monitoring of water distribution networks using wireless sensors and mathematical models.

The resulting product is an integrated management system for the real-time management of water distribution networks. Such management strategies assist the network owners in evaluating the condition of their network, in assessing historical incident and risk-of-failure data and in prioritizing the work based on the inherent risk and cost of action.



Dr Syam S. Andra

Cyprus International Institute for Environmental and Public Health in Association with Harvard School of Public Health, Cyprus

Dr. Syam S. Andra specializes in the areas of studying fate and transformation of contaminants in environment, characterizing and quantifying chemical/biological markers for humans' exposure to pollutants, health risk assessment, and developing mitigation technologies. Syam is currently a Research Fellow under the supervision of Dr. Konstantinos C. Makris at the Cyprus International Institute, working on water and health aspects. Prior to this he held research positions at the Harvard School of Public Health (2010) and Oregon State University (2009), and Ph.D. in Environmental Science and Engineering from the University of Texas at San Antonio (2008) in the United States.

Human exposures to water contaminants after contact with packaging materials: round-up on research updates and gaps

Growing market for drinking water and other related beverages (sodas, energy drinks etc.) requires that such consumer products be packaged in water contact materials (WCM). Endocrine disrupting chemicals (EDC) as constituents of WCM are plastics additives (phthalates, bisphenol A etc.) used in container material for marketing water in several forms (spring water, flavored water etc.), packaged in various plastic types (polyethylene terephthalate, polycarbonate etc.), and in different container volumes (0.5L, 19L etc.). We were able to delineate the association between water consumption patterns, bottled water plastic type, and exposure to EDC. Current studies in our laboratory are focused on identifying and quantifying biomarkers for EDC exposure from water intake using metabolomics and ionomics approaches. Pregnant women and children tend to be vulnerable subpopulation to WCM effects. Exposures during these life stages may not only reflect in immediate health manifestations but also can carry over to next generation. In light of appropriateness of this topic, a trans-disciplinary research agenda is required for attaining an improved understanding spanning WCM sources to exposure routes to human health burden and prevention measures. My focus, on behalf of our team, will be on presenting a roadmap that presents current status and future directions in WCM research.



Dr Yoseph N. Araya

Birkbeck College, University of London, United Kingdom

Dr. Yoseph Araya, is an ecologist and lecturer in Environmental Geography. He has worked in ecohydrological aspects of nature conservation, terrestrial biogeochemical cycling and global water issues in Africa and Europe. He is a keen communicator of science and passionate about the public's education. In this connection, he has participated and initiated local and global education initiatives that have encompassed science, culture and technology.

Digital social networking for science and dialogue in global water issues

The world faces severe and growing challenges in maintaining water quality and meeting the rapidly growing demand for water resources. The decline in availability of existing water supply, often due to unsustainable management, further exacerbates the problem.

The challenge of keeping a sufficient water supply has meant, there is even greater responsibility for judicious management of water resources to meet various needs and priorities. In this quest, scientists are required to provide sound advice to the public and ultimately decision makers.

Obtaining data for scientifically sound analysis is intensive work: requiring data across spatial/time scales, and massive funds. One solution to this is to draft more people e. g. Citizen Scientists to help the professionals by making them aware of issues/data from study sites.

Side by side, rapid technological developments on internet network and mobile (often geo enabled) devices; coupled with their increasing adoption by the public, presents unprecedented capability in gathering, recording and communication of environmental data/information.

Such mutually beneficial collaboration between citizens, scientists and decision makers can potentially help improve scientific investigations as well as empower citizens to engage in water issues.



Dr David Benson

University of East Anglia, United Kingdom

David Benson is currently a lecturer in environmental politics, policy and governance at the School of Environmental Sciences, University of East Anglia (UEA). A former ESRC Post Doctoral Fellow, he is affiliated to several research groups at UEA including the Tyndall Centre for Climate Change Research and the Centre for Social and Economic Research on the Global Environment (CSERGE). His interdisciplinary research interests extend over several areas of social and physical sciences, and he has published on various aspects of environmental governance. He is currently conducting research on collaborative catchment management, the sustainability of the green economy in multiple national contexts and comparative climate policy.

Resolving water conflicts through collaboration: developing a catchment management template

Competing pressures on UK water resources from pollution, over-abstraction and climate change, together with the requirements of EU legislation, have prompted demand for novel catchment scale governance approaches based on collaborative management principles. Here, multiple actors from different institutional levels, both state and non-state, work together in the resolution of multi-use water problems through negotiation, catchment planning and consensual implementation of management strategies. In order to provide policy relevant recommendations on optimal approaches for the UK context, the research aimed at developing a 'template' for collaborative catchment management by drawing on lessons from international comparative practice. Together with research partners in the USA, Australia and EU, a number of significant lessons on potential governance models and management processes were identified. These lessons were then applied to two UK catchment case studies located on the Thurne (East Anglia) and Tamar (Devon-Cornwall) rivers. From the analysis of this application, a normative 'template' for guiding future collaborative and adaptive catchment management was developed. This research is currently enjoying significant attention amongst policy makers and has been cited by the UK Government House of Lords, the Department of Environment, Food and Rural Affairs, and the OECD.



Dr Gary Bilotta

University of Brighton, United Kingdom

My research links the disciplines of hydrology, geomorphology, biogeochemistry and freshwater ecology, in order to provide solutions for one of the greatest challenges faced by civilisation - the sustainable provision of water and food whilst maintaining the ecological integrity of aquatic ecosystems. My research focusses on four themes: (i) Quantifying fluxes of particulate matter from terrestrial to riverine environments; (ii) Modelling the environmental and climatic controls on these fluxes; (iii) Advancing understanding of the particle characteristics that determine the effects of these fluxes on water resources and freshwater ecosystems; (iv) Developing evidence-based water quality guidelines for international water resource legislation.

The importance of environment-specific management of freshwater resources and ecosystems: Managing suspended sediment pollution as an example

Managing water resources is one of the greatest challenges facing civilisation. Water is a resource that is under growing pressure as the global population rises, and the natural supply is becoming increasingly variable and uncertain with climate change. It is therefore essential that water resources are managed sustainably in terms of both their quantity and quality. Within Europe water resources are managed through the Water Framework Directive (WFD), which details the quality guidelines (physico-chemical and hydromorphological), necessary to achieve good ecological status. For guideline-setting and assessment purposes, the WFD suggests that individual member states should use one of two typological framework systems: System A differentiates waterbodies according to ecoregion and fixed categories of environmental descriptors (altitude, size and geology). System B comprises obligatory factors and non-obligatory (environmental) factors, regarded as important determinants of the physico-chemical, hydromorphological, and biological characteristics. In this talk I demonstrate, through my research on suspended sediment/particulate matter, the importance of using System B-type typologies when establishing appropriate water quality guidelines for individual physico-chemical parameters, highlighting that the natural background concentrations of these parameters respond to environmental/catchment factors other than those considered in System A. Interdisciplinary research is needed for establishing evidence-based and environment-specific water quality guidelines.



Dr Maria Bostenaru Dan

"Ion Mincu" University of Architecture and Urbanism, Bucharest and Sibiu, Romania

Maria Bostenaru Dan graduated in architecture, specialisation in urbanism, at the Universität Karlsruhe/Germany. She was awarded 3 Marie Curie Fellowships/European Commission (two in Pavia, Italy) and a Canadian Centre of Architecture support grant. She is employed as researcher at the "Ion Mincu" University of Architecture and Urbanism, where she did her doctorate. She was "World Housing Encyclopedia" (USA) editorial board member. She is committee member at the networks "Semantic enrichment of 3D city models for sustainable urban development", "The EU in the new complex geography of economic systems" and "Network for Digital Methods in Arts and Humanities" and ICOMOS ISCARSAH.

Water ambivalence or natural hazards' impact on riverine urban areas

Numerous cities have (re)discovered their waterside landscapes as urban space and use their landscapal, urban, and architectural potentials to make a riverine city attractive. Some cities only turn today to their rivers because in the past it seemed wiser to build far from them, as from the river came not only blessing, but also danger. The presentation aims to investigate this ambivalence of the element water. For this purpose views from science and the arts are embedded. For the science stay insights from engineering hydrology. For the arts stay (urban) landscape planning up to (water) museum planning, debating both the content and the container. In a second step the discussion will focus even more on dealing with disasters. Building along the river is not only hazardous in what concerns flooding risk, but also for earthquake impact. Long distance earthquakes can have disastrous effects on high-density urban settlements, if alluvial soil deposits amplify the ground motion, in the case of cities built on river banks. Regarding natural hazards protection a different ambivalence can be identified. Providing safe housing leads to partly antagonic construction requirements in case of envisaging reducing flood and earthquake impact (for example presence or absence of basement spaces).



Dr Helen Bridle

Heriot-Watt University (from September 2012), presently The University of Edinburgh, United Kingdom

Helen holds a Royal Academy of Engineering/EPSRC Fellowship

focussing on developing methods, particularly those which offer the potential for automated and/or miniaturised systems, for the detection of protozoan pathogens, like *Cryptosporidium* and *Giardia*.

She obtained her PhD entitled "Techniques to manipulate the environment around and inside single cells" from Chalmers University of Technology, Gothenburg, Sweden in 2008. This interdisciplinary project developed a miniaturised fluidic device for studying biological signalling.

Helen has also worked on a biosensors project in the Textor Research Group at ETH Zurich, Switzerland, and for Mitsubishi Electric AB on an MSc thesis project entitled "Future Display Technologies".

Monitoring for waterborne pathogens

One major challenge in detecting waterborne pathogens is the concentration and enrichment of low numbers of pathogens in large volume water samples. Therefore, one research project I will present is focussed on sample processing, characterising the interactions of pathogens with filter materials to design more efficient concentration procedures with high recovery rates. Using a novel polymer microarray approach, to simultaneously screen over 650 different polymers, we have identified polymers which either enhance or prevent the adhesion of protozoan pathogens, both of which have potential filter applications.

In terms of detection, I will present one ongoing project using biosensors, including characterisation of a selection of surface modification protocols, to immobilise pathogen capture antibodies on the sensor surface.

Another challenge is the detailed characterisation of pathogens in terms of infectivity, providing accurate information to assess public health risk. I will present several early-stage projects, looking at methods of determining both the species and viability of the protozoan pathogen *Cryptosporidium*. The techniques include Raman spectroscopy, and dielectrophoresis and our projects aim to evaluate and apply these techniques in novel miniaturised formats.

Finally, I will conclude by summarising intended future directions and highlighting areas where I would be keen to establish interdisciplinary collaborations.



Ms Florence Bullough

Imperial College London, United Kingdom

I am currently in the third year of my PhD in the Earth Science and Chemistry departments at Imperial College London, working in the Water Geochemistry group. Both my Masters project and current PhD project are based around Arsenic geochemistry and its removal from drinking water. I also spent time working at the Natural History Museum, London looking at the interaction between goethites and siderophore compounds and a year working in industry in a contaminated land and groundwater remediation team.

Optimising the removal of toxic arsenic (III) and (V) from drinking water.

Arsenic-contaminated drinking water affects millions of people around the world particularly in Bangladesh and long term consumption of levels as low as $>10 \mu\text{g L}^{-1}$, (WHO limit) is known to be toxic and carcinogenic in humans.

Adsorption onto metal oxides is a key technology for the removal of dissolved arsenic from groundwater. The dominant arsenic species are As (III) and As (V); found in reducing and oxidising waters respectively. As (III) is ~60 times more toxic than As (V), more mobile, and has a poor adsorption performance. To address this issue a novel bi-composite $\text{TiO}_2/\alpha\text{-Fe}_2\text{O}_3$ adsorbent has been tested. This material has the potential to integrate (i) the photooxidation of weak adsorbing As (III) to As (V) under UV irradiation on the titanium phase, (ii) the adsorption performance of As (V) on the iron phase, and (iii) it is simple and cost-effective to synthesise.

The bi-composite material has been synthesised through different methods and at different Ti:Fe ratios to optimise As (V) removal performance. These materials were characterised through XRD, SEM and TEM imaging and B.E.T surface area analysis to confirm the metal phase, size and morphology of the powders. As (V) adsorption experiments were completed for all materials and had a Langmuir adsorption capacity (Q_{max}) ranges given as 7.45-16.98, 8.56-13.89 and 5.54-27.47 $\text{mgAs/gTiO}_2/\alpha\text{-Fe}_2\text{O}_3$ for each method at the three metal ratios when tested at pH7. These experimental performance data compared well with Bayoxide, an industrially used adsorbent, at 32.15 mg/g under the same conditions.



Ms Monica Cardillo

Centre de recherche en Histoire du Droit des Colonies, UMR 5815 Dynamiques du Droit, University of Montpellier 1, France

She took her degree in Law at the University of Trento. During her studies she was particularly interested in African law. She brought two researches in Mali on the problem of the effectiveness of the state law concerning the management of the forest's resources and its relationship with African customs. Currently she leads a Ph. D. on the legal regulation of the fresh water in the African colonies of the twentieth century. The research focuses on the current issue of water in Africa through a historical perspective, to understand the colonial policies of water resources' exploitation and their impact on the traditional techniques of water management.

The water issue between European law and African custom in the twentieth century

When the State takes possession of the colonized territories, he controls both the land and the resources to assure its complete domination. This also includes water's sources, which are part of the public domain. Under this principle called "public ownership of the resources", consolidated by the courts' activity, the colonizer begins his politics of hydraulic development. The State proprietary and ruler of the water undertakes the necessary works to satisfy the basic needs of men and their herds. The State introduces the irrigation's technique and attempts to erase all the small indigenous cultures, regarded as primitive.

Despite the efforts of the State to impose an industrial vision of water management, its activities are always obstructed by the indigenous, who perceive the resources as a sacred gift belonging to the supernatural world and protected by the gods for the general benefit. The indigenous therefore, jealous of their own customs, do not give up in front of the centralizing power of the State. They have three types of reactions: to ignore the power of the State, to accept its actions or to resist to its power. So what are the solutions adopted by the colonizer in order to fulfil its colonial mission?



Ms Katerina Charalambous

The Cyprus Institute, Cyprus

Katerina Charalambous received a BEng (Hons) in Civil Engineering from the University of Ulster and a MSc in Environmental Engineering from Queen's University Belfast. She began working at the Cyprus Institute as a research assistant in 2010 on national and FP7 water related projects. In September 2011 she joined the Institute's PhD programme. Her research interests are in the field of urban water management and include urban water modelling, water use in the tourism sector, water management in historic urban environments, rehabilitation of historic water infrastructure, efficient water use and application of water savings technologies, stormwater management and rainwater harvesting.

Bridging the divided city of Nicosia: The rehabilitation of the Pedieos River

The town of Nicosia owes its development partially to the Pedieos River, which flowed through the capital of Cyprus. The diversion of the Pedieos away from the town centre, followed by the filling-in of the river bed and construction of commercial buildings, lead to the establishment of Hermes Street. Due to conflicts between Greek and Turkish Cypriots, in 1964 the "Green Line" was drawn along Hermes Street, to separate the two communities. This was followed by the demarking of the 180-km long buffer zone during the political events of 1974, which splits the island of Cyprus into two. Today the river flows from one side of the town, through the buffer zone, to the other side. Bi-communal projects are being carried out to repair relationships of the two communities and rehabilitate the old town centre. As part of these inter-communal efforts rehabilitation of the old river and the conversion of the buffer zone running through the town into a leisure spot is suggested. The project would incorporate sustainable stormwater management, allow for the preservation of the natural habitat of wildlife in the area and the blending of Nicosia's old town centre with the surrounding current and future developed areas.



Ms Lina Eklund

Lund University, Sweden

Lina Eklund has a M.Sc. in Physical Geography and Ecosystem Analysis from Lund University with a focus on Geographical Information Systems (GIS) and Spatial Analysis. For her

Ph.D. dissertation, Lina is researching the environment-migration nexus in the Middle East, and she is currently focused on the Iraqi Kurdistan area. While migration often is a sociological subject, this research project seeks to use geographic tools to map and analyse migration patterns of people, and their relations to water availability, environmental degradation and climate variations.

Dealing with Drought – Water challenges in Iraqi Kurdistan

Drought is a common phenomenon in Iraq and the Middle East and for hundreds of years people have developed different ways of dealing with, and adapting to, drought. In the future, climate change is likely to cause even more of these slow onset disasters all over the world and therefore it is important to investigate how to deal with the drought and its consequences. We can learn a lot from different techniques, both the ones that work and the ones that do not. This presentation will show some of the ways that private households, governments and organizations in northern Iraq have used to deal, or tried to deal, with the drought. I will bring up how water is perceived and handled, how the government choose to help the people affected by the drought, how the drought affected the migration patterns and how an ancient irrigation technique might be one of the solutions. I hope that my short presentation will provide a basis for further discussions on how drought can be dealt with, on different levels, in a sustainable way.



Ms Cecilia Fenech

Dublin City University, Ireland

I am an Early Stage Researcher reading for a PhD as part of a Marie Curie Initial Training Network ATWARM at Dublin City University. My

interests lie in the area of analytical chemistry, especially in the area of environmental science and in particular water pollution. My current research focuses on the use of environmental forensics to identify and characterise sources of nitrate contamination to fresh surface water bodies. Prior to moving to Ireland I obtained a BSc (Hons) in Chemistry and Biology and an MSc in Biology from the University of Malta.

Environmental forensics - An interdisciplinary approach to environmental science.

Recently, there has been increasing interest in environmental forensics applications for nitrate source determination. To date, nitrate stable isotope compositions have mainly been used for this purpose. However, nitrate isotopes do not successfully differentiate sewage and manure sources. Such a differentiation is of particular importance in relation to health, environmental and legislative considerations. Two significant gaps in research, which involve two radically different research disciplines, have been identified and are informing current research. The first involves the development and application of a suite of chemical markers for differentiating sewage and manure inputs into surface waters. This involves the development of standard chromatographic methods as well as the novel application of techniques, such as isotope ratio mass spectrometry and nuclear magnetic resonance, to achieve differentiation. The second research gap involves the development, dissemination and analysis of a questionnaire to understand current attitudes to the use and disposal of medication. Aspects related to the integration of the various disciplines necessary for such research will also be discussed. These include analytical chemistry, survey development, statistics, geocomputation and geochemistry. Issues identified in developing such a research strategy and the reasons for taking such an interdisciplinary approach will also be addressed.



Dr Viachaslau Filimonau

Bournemouth University, United Kingdom

Viachaslau Filimonau is a Postdoctoral Research Fellow in School of Applied Sciences at Bournemouth University. His research interests include groundwater management, global water balance and environmental impact assessment. His current research project aims to better understand the patterns of water consumption in the service sector companies in the UK.

Assessing the magnitude of global groundwater stocks: a critical overview

Groundwater is an important environmental resource. Due to growing global demands for groundwater, accurate estimates of its stocks and recharge are essential. Despite a significant number of existing global groundwater balance studies, estimated numbers of available stocks and recharge differ with a variance of up to 585 %. This may lead to inaccurate calculations of groundwater usage.

The significant variance in the estimates of global groundwater stocks suggests that the factors and sources of uncertainties which have caused the discrepancy need to be better understood. Global water and groundwater balances are controlled by natural processes that are difficult to quantify on large scales. In addition, human activities are expected to cause yet unknown or poorly examined influences. Globally, these influences may indirectly stem from climate change, and more regionally they may originate from reshaping water flows through damming, channelling, or subsurface constructions; water pollution and abstraction also play an important role.

Better quantifying such uncertainties may help to mitigate the accelerated depletion of groundwater stocks which threatens to make the most important source of freshwater scarce. This presentation discusses the reasons and sources of uncertainties outlining some possibilities for reducing their magnitude.



Mr Animesh Kumar Gain

Ca' Foscari University of Venice, Italy

Currently, Animesh Kumar Gain is the final year PhD candidate of Climate Change Programme of Ca' Foscari University of Venice and affiliated researcher of Euro-Mediterranean Centre on Climate Change (CMCC), an Italian research centre dedicated to climate related research. He holds BSc in Environmental Science and MSc in Water Resources Development. Having research interest in the broad field of climate change impact and adaptation of water resources system, he has published several articles in peer-reviewed journals and presented his research outputs in several international conferences. For his research, Mr. Gain has worked with several organizations of Asia and Europe.

A Dynamic Approach of Climate Change Adaptation and Vulnerability Assessment of Water Resources System at Lower Brahmaputra River Basin

Water is the primary medium through which climate change influences the Earth's ecosystems and therefore people's livelihoods. Beside climatic change, demographic trends, economic development and related land use changes have direct impacts on increasing demand for freshwater resources. Taken together, the net effect of these supply and demand changes is affecting the vulnerability of water resources systems, which are in complex interaction of both natural and human elements of the social-ecological systems. Therefore, for assessing vulnerability of water resources systems and defining climate change adaptation policies, the integrated contribution of several disciplines is required, enabling a comprehensive, but also complex, dynamic description of present state and future trends. In this study we provide an operational system analysis approach and a simulation tool for vulnerability assessment of the water resources systems that has been developed within the broad context of climate change adaptation with an aim to support decision making processes. The methodology has been applied in the Lower Brahmaputra River Basin. Vulnerability assessments for both the baseline and future scenario can be used to select appropriate adaptation options. The results of this study are intended to be used for contributing to planned adaptation of water resources systems of the region.



Dr Leonith Hinojosa-Valencia

The Open University, United Kingdom

I am economist by training, with a PhD in Environment and Development (University of Manchester, UK). Currently I am a Research Fellow at the OpenSpace Research Centre in

The Open University and External Associate to the School of Environment and Development and the Brooks World Poverty Institute in the University of Manchester. My recent research includes three projects on the political ecology of water and mining in Peru, rural territorial dynamics and socio-environmental conflicts associated to extractive industries in Andean countries. My work involves multi-disciplinary teams and my approach combines quantitative, qualitative and spatial analysis of socio-economic development and sustainability.

Differential water sustainability and security associated with the expansion of the gas industry in Tarija-Bolivia

In the conflictive relationships between companies from extractive industries (mining, oil, gas) and local populations, two contentious concerns are: (1) whether or not the expansion of these industries generates scarcity for other water users; (2) whether such an expansion increases inequalities in water distribution and threatens sustainability and environmental justice.

Informed by Ecological Economics and Economic Geography approaches, I suggest that the impact of extractive industries on water resources and their change can be approached by a GIS model that maps the change of water ecosystem services, based on data from satellite imagery, in a timeframe that allows seeing trends towards sustainability/unsustainability. To address water justice and sustainability issues, I use a qualitative analysis of water governance mechanisms based on data on water infrastructure enabled by mineral rents, the institutional framework in which water rights are granted and the practices for water distribution and management. Differential water sustainability refers to a process that describes how groups of water users and territories differentiate according to continuous imbalances in access to water. Empirically my analysis brings evidence from Tarija, the natural-gas richest region of Bolivia, yet one of the poorest in water resources.



Ms Mine Islar

Lund University, Sweden

I received my Bachelor`s degree in Political Science and International Relations from the University of Bogazici, Istanbul; Master`s degree in

Asian studies from the University of Lund. In my master`s thesis I examined the development policies of Malaysia. Recently, I am in my third year as a PhD candidate at the LUCID Research School of Lund University. During my PhD studies, I was given the opportunity to be a visiting fellow at the Institute of Resource, Environment and Sustainability (IRES) in the University of British Columbia, Canada where I worked with Dr. Leila Harris and Dr. Karen Bakker on water governance.

Rivers and struggles: private hydropower development in Turkey

The study focuses on the case of Turkey where water use rights of national and transboundary rivers are transferred to private sector for the production of hydroelectricity. I aim to answer the effects of this process on the patterns of ownership, state-society relations, social and environmental livelihoods. By analyzing the impacts of private hydropower development it contributes to the debate on water privatization in rural areas where rivers are the main arteries of livelihoods, irrigation and sources of drinking water. Also, I question the renewable energy solutions and thus the sustainability of run-of- river hydro projects by addressing the issues of justice and fairness, water rights, control of and access to water. More specifically, I pose the following research questions (1)What are the implications of privatized hydropower development in relation to the regimes of entitlements to water? (2)During the hydropower development, how have rivers become sites of contestation in which various actors struggle for their own representations of river? What forms of social resistance take place? The empirical evidence from the fieldwork in Black sea region and South Anatolia, indicates the complexity of water privatization in the rural context and different valuations of river attributed by state, private actors as well as local communities.



Dr Zena Kamash

University of Oxford, United Kingdom

I am currently Director of Studies in Archaeology at Magdalen College, Oxford and Senior Researcher on the ERC-funded 'English Landscapes and Identities Project' at the School of Archaeology, Oxford. My major research areas are in science and technology, material culture theory, memory and religion in the Roman world. My doctoral thesis (University of Oxford, 2007) analysed freshwater management and technology in the Roman Near East from 63BC to AD636), exploring the rhythms of technological practices and what factors governed water management choices.

Balancing supplies: approaches to managing urban and rural water resources in the Roman Empire

The Roman Empire brought with it a boom in urban amenities that needed a vast water supply. At the same time there was a rising pressure for agricultural production. Such a tension would have required a realignment of water management practices, challenging long-held attitudes towards the roles of water. I aim to explore the links between the value of water and conflicts and co-operation involving water in: the north-western provinces, Italy, North Africa and the Near East. I will address several key questions: in what ways did attitudes towards water affect approaches to its use and management? To what extent was there conflict or co-operation between urban and rural needs? How did people respond to external forces and policy makers controlling their water? What was the balance between socio-cultural concerns and pragmatic decisions? My main aim is to examine how archaeological studies can be used to inform other disciplines and modern policy creation as well as exploring the feasibility of creating an over-arching framework of study. This discussion will centre around the extent to which there are universal factors that govern water management and to what extent approaches to water management are the product of cultural, temporal and/or geographical specificity.



Dr Silja Klepp

artec | Research Centre For Sustainability Studies, University of Bremen, Germany

The social anthropologist Dr. Silja Klepp is an Associate Scientist/ Postdoc at the artec | Research Centre for Sustainability Studies at the University of Bremen. Her field research experience includes countries such as Kiribati, Vanuatu, New Zealand, Italy, Libya, Malta, and Zambia. Her main interest is the design and realisation of innovative empirical research projects in emotionally charged and politically sensitive fields. In 2012 she won the Christiane Rajewsky Award of the German Association for Peace and Conflict Studies for her PhD on refugees and border control in the Mediterranean Sea. Fields of research expertise: migration and refugees, international co-operation, climate change in the humanities, legal anthropology, political ecology, STS.

Climate Change and Migration - New Rights and Resources for Environmental Migrants in the Pacific Region

My research explores negotiation processes around new rights and resources for 'climate change refugees' in Oceania and debates linked to issues of 'climate justice'. In 2011 I was conducting studies in New Zealand and in the Republic of Kiribati, which is globally perceived as one of the first "victims of climate change" and has been recently developing innovative "climate migration" strategies for all citizens. Labelled as "climate change migration" and with the overall strategy to "migrate with dignity" the government is currently bargaining different migration programs with New Zealand, Australia and other countries. A Memorandum of Understanding with the government of Fiji regarding the issue of community relocation is planned for the next future. My research project aims to examine these innovative strategies, their political and social context and the impacts these policies and practices have on the island state and its citizens. Processes of rule-setting and law-making "bottom up" and the more general change of values in the context of climate change are the focus of my research. To link my presentation closely to subjects discussed in Stresa I will centre it around questions on distribution of resources and on adaptation policies that are sensitive to local and regional power structures and cultural aspects.



Dr Jernej Letnar Černič

School of Government and European Studies, Slovenia

Jernej Letnar Černič is Assistant Professor of Human Rights Law at the School of Government and European Studies. He graduated from the University of Ljubljana with the France Prešeren award and obtained an LL.M in Human Rights Law at the Raoul Wallenberg Institute for Human Rights Law and Humanitarian Law, University of Lund, Sweden. He completed his Ph.D. in Law at the School of Law, University of Aberdeen, Scotland, UK. He is a member of the International Human Rights Committee and Feminism and International Law Committee of the International Law Association and of the Institut International des Droits de l'Homme. He has written extensively on human rights law and international law.

Corporate obligations under the right to water

Almost a billion people do not have access to clean and safe water. Access to safe drinking water and sanitation is increasingly being considered a fundamental human right. Corporations play an important role in the realization of the right to water. For example, they can become violators of the right to water where their activities deny access to clean and safe water or where water prices increase without warning. Corporations can have a positive or negative impact on the human rights of individuals, wider communities and indigenous peoples. This paper argues that corporations bear a certain responsibility for the realization of the human right to water, which can be derived from international as well as national (constitutional) law. It is asserted that this responsibility is different and separate from the responsibility of state governments and should never undermine state obligations to observe the human right to water. In short, the paper argues that corporations have a responsibility to respect, protect and fulfil the right to water deriving primarily from national legal orders.



Ms Ioana Nicoleta Meleg

„Emil Racoviță” Institute of Speleology, Romanian Academy, Romania

Ioana N. Meleg (Ph.D. student at „Emil Racoviță” Institute of Speleology, Cluj-Napoca, supervisor O.T. Moldovan) studies the distribution patterns of groundwater assemblages (mainly crustaceans) in relation to environmental parameters and their phylogenetic relationship in groundwater habitats in Romania.

Crustacean indicator species as proxies for groundwater conservation

Groundwater research and conservation is important in the context of world's diminishing freshwater resources. Understanding the ecologic and socio-economic values of freshwater is a stepping stone for freshwater conservation. Its value as an ecological indicator is due to the specialized fauna adapted to subterranean life and to a high rate of endemism. The socio-economic value of groundwater ecosystems is due to the role played by invertebrates as ecosystem services providers (i.e. water purification, bioremediation, and water infiltration and transport) that maintain a high water quality.

Crustaceans are the most diversified and abundant in groundwater assemblages, therefore their use as environmental proxies should be considered. Multivariate statistical analyses and GIS predictive modelling are useful tools in identifying the environmental parameters influencing subsurface crustacean distribution. The aim was to depict suitable areas for crustacean population persistence in groundwater habitats as indicator for groundwater ecosystem state of health. The outcome of the assessment is useful and relevant for the evaluation of groundwater protection needs in the Romanian Carpathians and other karst areas.



Ms Resty Naiga

University of Natural Resources and Life Science Vienna (BOKU), Austria

I am a female Ugandan currently a PhD research fellow at BOKU. I hold a Master of Development Studies from University College Dublin, Ireland; and a Bachelor of Social Science from Makerere University Kampala, Uganda. My interest and core competencies where I have so far done several studies lies in the area of Gender Mainstreaming, analysis and planning, governance and social accountability tools. My PhD research aims to ensure equitable and sustainable access to safe water by the rural poor in Uganda. Prior the PhD, I was and continue to work with Makerere University as an Assistant Registrar and a part-time lecturer.

Water Governance for Equitable and Sustainable Access in Rural Uganda

Over the last 10 years, Uganda has experienced public policy reforms in the rural safe water sub-sector with varying implications on access and sustainability. The most critical reform being a shift from the supply-driven to demand-driven approach in rural safe water supply. Since the implementation of the demand-driven approach in the early 1990s, rural safe water coverage has not only moved at a slow pace but maintenance of water sources has equally posed a great challenge. This paper presents the findings of the water situation in Uganda. The methods used were semi structured interviews at national, district and community levels. According to the findings operation and maintenance seem to be the critical challenge to sustainable access to safe water in rural Uganda. Conversely, the challenge of operation and maintenance was found to be closely linked to management structures in place and the shifting paradigm in water service provision in rural Uganda. The ultimate aim of the study is to suggest a model for governing collective action in a financially constrained environment like Uganda.



Ms Klára Nedvědová

Institute of Theoretical and Applied Mechanics Academy of Science, Czech Republic

Education:

2012 Entered PhD Faculty of Civil Engineering CVUT

2003 Engineer architect - Faculty of Architecture CVUT

2002 Master - Faculty of Social Science, Charles University

1998 Bachelor - Faculty of Social Science, Charles University

1993 - 2002 Faculty of Architecture, Czech Technical University

Positions:

Since 2011- ITAM AS CR (Institute of Theoretical and Applied Mechanics, Academy of Science CR) – project of Ministry of Culture programme – Methodology of Protection and Rescue of Cultural Heritage against Flood

2009 - 2010 National Institute of Monument Protection in Telč – department of documentation

2009 ITAM AS CR – participation in European project Cultural Heritage Protection against Flooding

Since 2006 freelance architect

2006 Architect in an architectural studio – Prague

2005 Internship in RRA Architects studio – UK

2003 - 2005 National Institute of Monument Protection in Prague – department of documentation, monitoring of the UNESCO site

Methodology of Protection and Rescue of Cultural Heritage against Flood

During last 15 years we have been experiencing many severe flooding that influenced almost every part of the Czech Republic. Except damages of life and property there have been loss of historical monuments, devastation of sites and changes in historical landscape. Irreversible loss and great expenses spent to restoration and renewal and led to the conclusion that integrated flood risk management is needed. It also appeared that if we want to protect effectively historic environment against flooding we have to apply way more sensitive and conscious approach as placing permanent flood-protecting constructions can destroy the site as well as disaster itself. Cooperation between experts from different domains has to be established to achieve required outcome.



Ms Gül Özerol

University of Twente, the Netherlands

Gül Özerol is a researcher and PhD candidate at the University of Twente, the Netherlands. She has professional and academic backgrounds in industrial engineering, organisational management, decision science and integrated assessment. Her main research interests are natural resource governance, agricultural water management, public participation and multi-criteria methods. In her ongoing PhD project, she is examining the integration of environmental sustainability into irrigated agriculture, and she is applying policy studies and political ecology perspectives to understand the role of scales, levels and public participation in the governance of water and land for irrigated agriculture.

The food-water-land nexus in irrigated agriculture: A multi-scale governance perspective

Irrigated agriculture is a key element in the food-water-land nexus. It is strongly associated with food security and poverty reduction in many countries and has become a major user of water and land resources. However, it is also a potential threat on sustainability due to its negative environmental impacts such as the pollution and degradation of resources. Although the immediate causes of these impacts are technical, governance mechanisms are increasingly referred as the root causes. Therefore a closer investigation of the governance mechanisms can improve the understanding of the food-water-land nexus and improving its integration, which is conducive to sustainability.

A multi-scale perspective is proposed to analyse the governance of water and land resources in irrigated agriculture through incorporating the jurisdictional, spatial, institutional and temporal scales. Findings from an empirical study in Turkey demonstrate that there are both obstacles and opportunities to improve the alignment between the levels of scales and among different scales. The multiplicity of policy sectors and actors exacerbates the complexity of the food-water-land nexus. Given this inherent complexity, improving the alignment of multiple scales is not a straightforward, yet a promising endeavour towards sustainability.



Ms Stephanie Palmer

*Balaton Limnological Institute,
Hungarian Academy of Sciences
Centre for Ecological Research,
Hungary*

Originally from Canada, Stephanie is currently based at the BLI as an early stage researcher of the Marie Curie FP7 programme “GIONET” – Global Monitoring for Security and Environment Initial Operations Network for Research Training (gionet.eu). Her current work in developing and applying remote sensing methods to improve the spatial and temporal understanding of Lake Balaton water quality will also form the basis of her PhD research, undertaken at the University of Leicester in the UK.

Remote sensing to improve freshwater quality monitoring

Perceived changes to freshwater systems, the degradation of water quality, as well as the causes and effects thereof, are complex, interacting and vary over a range of spatial and temporal scales. To choose the most appropriate management and adaptation decisions, baseline information is required, as is a means to monitor the system and to evaluate chosen actions and the subsequent results in a quantitative manner. Unfortunately in most cases such data proves to be limited or non-existent. Remote sensing has the potential to provide data with spatial and temporal coverage not possible through most conventional sampling approaches. Furthermore, some current and future remote sensing data is available in near-real time. It is thus highly suited to monitoring and to the identification of patterns and phenomena that would otherwise go unrecognized. Interpretation of remotely sensed satellite imagery remains a challenge, particularly in the context of freshwater quality monitoring. Advantages and present limitations of the remote sensing of lake water quality are discussed and the case of Lake Balaton (Hungary) is introduced as an example.



Dr Anna G. Piotrowska

Jagiellonian University, Institute of Musicology, Poland

Anna G. Piotrowska studied musicology at Jagiellonian University (Krakow, Poland) and Durham University (UK). In her research she mainly focuses on cultural aspects of musical life and the place of music in human society. She has authored two books (in Polish) and published a number of articles. She actively participates in many international conferences. In 2010 she was a Fulbright Fellow (Boston University) and in 2009 she was awarded the Moritz Csaky Preis (Austrian Academy of Sciences). She is also the recipient of other grants and fellowships (e.g. Mellon Fellowship in Edinburgh University in 2005).

Music on/ through/ by/in water or water music? On the meaning of water for music

The aquatic topic in music is a widely recognized and researched phenomenon since water belongs to one of the most popular sources of inspiration for composers. In the presentation I would like to demonstrate various associations between music and water depending on the discussed epoch and composer (Bach, Telemann, Elgar, Debussy, Takemitsu). By presenting variety of interpreting water in music and by highlighting different purposes the concept of water (or water itself) has been used in music (imitation of the sound, texture reminiscent of water, rhetoric figures, etc.) I intend to underline the diversity of attitudes and approaches to water as represented by individual musicians.



Ms Anna Ráhel Radványi

Corvinus University of Budapest, Hungary

Education:

2011 Ph.D. Student - Corvinus University of Budapest, Department of

Mathematics

Research area: Cooperative Game Theory

2010 MSc in Mathematics - Eötvös Loránd University

2010 BSc in Applied Economics - Corvinus University of Budapest

Positions:

2011 Junior Research Fellow - Institute of Economics, Research Centre for Economic and Regional Studies, Hungarian Academy of Sciences

2007-2011 Lecturer - Corvinus University of Budapest, Department of Mathematics

2010-2011 Lecturer - Budapest University of Technology and Economics, Department of Computer Science and Information Theory

The Shapley Value for Airport and Irrigation Games

In this paper cost sharing problems are considered. We focus on problems on a rooted tree, we call these problems cost-tree problems, and on the induced transferable utility cooperative games, we call these games irrigation games. A formal notion of irrigation games is introduced, and the characterization of the class of these games is provided. The well-known class of airport games (Littlechild and Thompson, *The Bell Journal of Economics*, 1977) is a subclass of irrigation games. The Shapley value (Shapley, *Annals of Mathematics Studies*, 1953) is probably the most popular solution concept for transferable utility cooperative games. Dubey (*Management Science*, 1982) and Moulin and Shenker (*Econometrica*, 1992) show respectively, that Shapley's and Young's (*International Journal of Game Theory*, 1985) axiomatizations of the Shapley value are valid on the class of airport games.

In this paper we extend Dubey's and Moulin and Shenker's results to the class of irrigation games, that is, we provide two characterizations of the Shapley value for cost sharing problems given on a rooted tree. In our characterization results we relate the TU games terminologies to the cost sharing terminologies, so we bridge between the two fields.



Mr Arun Rana

Lund University, Sweden

I am PhD Student at Department of Water Resources Engineering, LTH, Lund University, Sweden working on Effect of Climate change on Urban Hydrology with special context to

Mumbai. My research interest includes: Urban Hydrology and Management, GIS and RS in Urban Drainage and Water Management, Water resource modeling and optimization, Climate Change and Climate Variability, Water and Wastewater treatment processes, design and management.

Mapping and situation analysis of drinking water in India – A participatory approach

Geographical space is a vital factor over a broad range of decision making problems. Participatory Resource Mapping (PRM) can be a vital tool for collection and assimilation of data on broader spatial scale with ease and accuracy. In this paper we seek to determine the connections between PRM and its linkages with the grassroots knowledge possessed by the local communities. We have presented a case study of PRM in seven villages of Guna district, Madhya Pradesh, India. The results of the study are presented in form of resource maps. This study focuses on problems faced by villagers in accessing drinking water which may be based on social or economic structure of the society. Mapping of resources is carried out to study in depth the problems existing and with perception that public participation research efforts largely adhere to the more positive first view and seek to develop approaches, technologies and mechanisms that aid self-determination. Problems faced includes shortage of drinking water, social discrimination based on sex and income, depleting of groundwater resources, exploitation of water resources, deteriorating water quality among many others. Finally we conclude with suggestive measures that can be taken for improvement of adverse conditions in these villages.



Mr Josselin Rouillard

University of Dundee, United Kingdom

Josselin is a PhD student working at the University of Dundee and the University of Edinburgh. His PhD focuses on integrated water management, in particular the

development of a catchment approach in flood management in Scotland. More theoretically, his work is grounded in studies of adaptive governance and the policy sciences. Before studying his PhD, Josselin worked as a consultant specialised in the implementation of the EU Water Framework Directive. Josselin graduated from the University of Reading and the University of Oxford in environmental management and policy.

Adaptive Governance for Integrated Water Resource Management

With rapid environmental change, and the escalating threat of natural and technological hazards, there is a growing interest internationally in making society less vulnerable to environmental and social crisis, in particular with regards to water issues. Integrated Water Resources Management (IWRM) is now the dominating paradigm to improve water management. Taking Scotland as a case-study, the presentation explores how governance arrangements can better mediate conflicts and dialogue in the implementation of IWRM, and increase the overall resilience of social-ecological systems. It discusses where Scotland is creating processes that question the status-quo, foster reflexion and promote collective action for IWRM, and where it is failing to do so. It draws on historical research on the interface between science and national policy-making, as well as research in the IHP-HELP Tweed river basin in Scotland. The HELP-Basin programme is a worldwide, UNESCO-led, and watershed-based network. It aims to foster greater dialogue and collaboration between scientific disciplines, decision-makers, and local communities. Benefits and challenges of greater inter-disciplinary approaches to water management research and practice are outlined.



Mr Darío Salinas Palacios

*Institut Français de Géopolitique –
Université de Paris 8, France*

Degree in Geography at the University of Murcia (2008) with Erasmus stays at the University of Liege and of Seneca in the Universidad Autónoma of Madrid. Master in International Relations, at International University of Andalusia (2009). Master 2 at the Institut Français de Géopolitique (University of Paris 8) with a master theses on water geopolitics in north of Mexico. Stay researcher at Institute for Advanced Study in Water of Madrid (2011). Currently carrying out doctoral thesis at the University of Paris 8 and in co-supervision with the University of Murcia on water geopolitics in the Region of Murcia.

Geopolitics of water in the Spain of Autnomies : Challenges and power rivalries in the Region of Murcia

The Segura Basin lies mainly in the Region of Murcia and the south of Valencia, and it was subjected to an intensive irrigation agriculture and a growing urban consumption. The existence of an interbasin water transfer between the Tagus and the Segura avoids the structural deficit of the basin. However, the high degree of competencies acquired by the Autonomous Communities in Spain has contributed to increase the number of conflicts between different regions around territorial issues related to water access in recent years. The will of the government of Castilla La Mancha to stop water transfers and the derogation of the transfer project Ebro-Segura by the Socialist Party in 2005 has entailed a high politicization of water issues that confronts the two main political parties and different concerned territories. In this context of power relations between different actors, new political changes are taking place after the regional and legislative elections in 2011; the Popular Party won in traditionally socialist regions such as Aragon and Castile-La Mancha, and obtained an absolute majority in the national parliament. This political framework shows that water problems in Spain aren't only the outcome of scarcity but a geopolitical situation between political parties and regions.



Dr Joško Sindik

*Institute for Anthropological Research,
Croatia*

Joško Sindik is born in Dubrovnik in 1965. Employed as professional advisor at Institute for Anthropological Research. In 1988 he achieved BA in psychology at Faculty of Social Sciences and Humanities, in 2001 MS and in 2009 PhD in kinesiology at Faculty of Kinesiology (all at University of Zagreb. He worked as child psychologist and as lecturer at Faculty of Teacher Education (University of Zagreb), Police Academy, Croatian Olympic Academy (Zagreb), Study of Nursery (University of Dubrovnik). Scientific Associate Researcher in Humanities and in Social Sciences. Active research interests: cross-cultural and sport psychology, research methods in social sciences and humanities.

How do different people perceive symbolic values of the water – an interdisciplinary approach?

Identification of differences in the perception of the symbolic values of water can lead us to get better insight into the different meanings of the term “water” for each individual. From the point of view of social psychology, water has different importance in lives of each individual, depending on living around water or having professions closely connected water. The aim of our study was to find out if some demographic and socio-economic characteristics are connected with latent dimensions that represent symbolic values of water. We have examined snowball sample (N=137) of people in Croatia. Among symbolic meanings of water, we extracted three symbolic values of water: abstract, concrete and identity. While abstract values of water are mainly mythological and religious, concrete values describe practical use of fresh water. Identity value represents national and regional affiliation. Small number of statistically significant correlations we found between symbolic values of water and age, work experience and education level. No significant gender differences in symbolic values of water were found according to the type of profession, while women have higher means at abstract values of water. Participants that were born near the sea have higher means.



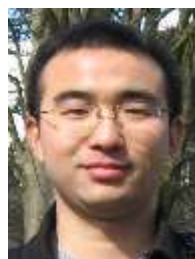
Dr Anton Vrieling

University of Twente, Faculty of Geo-Information Science and Earth Observation (ITC), The Netherlands

Originating from a small village in the Netherlands, in 1995 I embarked on the interdisciplinary study Tropical Land Use (Wageningen). This provided me with worldwide experience collaborating with a wide range of cultures and disciplines. My current research spans from soil erosion mapping with satellite data (PhD) to forest monitoring, drought and food security assessment, and population studies. My focus is on analyzing spatial changes through temporal remote sensing imagery and derived products. Besides research I am actively involved in teaching and student supervision. I previously worked at the Joint Research Centre, SarVision, and Wageningen University (and several international projects).

Rainfall variability and food security: a future for African subsistence farmers?

Food availability and access remains a problem for an important part of Africa's population. Limited purchasing power, market access, and conflicts contribute to this. Two major global processes put additional pressure on subsistence agriculture in Africa, i.e. 1) an increased pressure on natural resources to satisfy food demands from rapidly developing countries, 2) climatic change: for large parts of Africa rising temperatures, declining precipitation, and more frequent droughts are expected that likely will reduce crop yields. Drought early warning systems use temporal satellite-derived information to provide input to large-scale food security assessments. This information includes precipitation estimates and vegetation indices. Anomaly maps compare current with normal conditions to obtain an indication of crop growth conditions. Besides early warning, long-term time series can spatially analyse past droughts. My presentation will illustrate what information satellite image time series provide for large-scale drought assessment. To partially respond to the title's question, a multi-scale interdisciplinary approach is needed: at the continental scale drought occurrence and future drought may be evaluated, and related to fluctuations in population density and food prices. Detailed field studies are required to inventory current coping mechanisms and their applicability for adapting to expected climatic shifts.



Mr Cheng Wen

University of Leeds, United Kingdom

Cheng Wen is a third-year PhD student with his research topic of "Payment for Ecosystem Services for the Middle Route of China's South-to-North Water Transfer Project". Cheng received his BSc in Environmental Science from Wuhan University of China. He has research experiences in field study on domestic wastewater treatment in the rural areas of Southwest China and laboratorial experiment on adsorption treatment for dye wastewater. Now Cheng's research interest focuses on economic valuation for ecosystem services, and using the policy instrument of Payment for Ecosystem Services in water resources management.

Willingness to Pay for Water Source Protection of the Middle Route of China's - South-to-North Water Transfer Project

The South-to-North Water Transfer Project is the largest water infrastructure in the world, which aims at transferring 44.8 billion m³/year of water to mitigate the severe water shortage in the north of China by its West, Middle and East Route. The success of the Middle Route in transferring high-quality water has been threatened by insufficient government funding for water source protection. A possible solution is to follow the Principle of Beneficiaries Pay to establish a Payment for Ecosystem Services (PES) scheme for raising funds from water users in the north. However, the key question, namely how much the northern water users would be willing to pay for water source protection has not been fully investigated yet. By conducting Contingent Valuation surveys with a total of 694 questionnaires in three cities along the Middle Route, this study investigated the urban residents' Willingness to Pay for water source protection in the form of paying a higher water price. Policy suggestions were presented on the feasibility of the PES scheme and how to promote its acceptance among the residents in the northern cities.



Ms Laura Woltersdorf

ISOE-Institute of Social-Ecological Research/ University of Frankfurt, Germany

Laura Woltersdorf works as a research assistant at ISOE in the research unit Water Infrastructure and Risk Analyses. In 2006 she obtained her degree in International Business Administration at the FH Wiesbaden and in 2010 her master's in Environmental Science at the University of Frankfurt with a focus on hydrology, environmental chemistry and social-ecology. In her master's thesis she assessed the sustainability of rainwater harvesting systems considering climate change in the Cuvelai Etosha basin in Namibia. In her PhD she assesses the reuse of wastewater in urban agriculture in the Cuvelai Etoha Basin in Namibia regarding aspects of sustainability.

Assessing the sustainability of a system composed of sanitation, wastewater treatment plant and urban wastewater reuse in agriculture. An example from Namibia

The increasing use of the world's freshwater resources, coupled with environmental deterioration and exhaustive use of limited resources in a modern urbanised society, calls for changes in urban water and wastewater systems. Worldwide the re-use of treated water for the irrigation of agriculture is increasingly seen as a key link in Integrated Water Resources Management. A new holistic approach entails closing the loop between sanitation and agriculture in order to recycle water and nutrients. The CuveWaters project introduces an urban water infrastructure composed of sanitation facilities, wastewater treatment plant and agriculture irrigation site. As a study region a small town in central-northern Namibia has been chosen. In my PhD I will assess this facility for sustainability, integrating the environmental, economic, social and institutional perspective. The re-use of treated water in agriculture might cause environmental problems such as soil salinization or eutrophication as well as health problems for the local population. The environmental impact of the facility will be assessed with a material-flow analysis that describes, quantifies and models water, nutrient, salt and energy flows within the system. In this way environmental problems related to these flows can be early recognized and prevented.



Mr Christos Zoumides

Cyprus University of Technology (CUT), Cyprus

Christos Zoumides is a postgraduate research fellow and a PhD candidate at the Department of Environmental Science and Technology, CUT. He holds a BSc (Hons) in Economics & Environmental Science from the University of Stirling (2007) and an MSc (with Distinction) in Ecological Economics from the University of Edinburgh (2008). His major research interests focus on economics of water, virtual water trade and water footprint accounting, and climate change impacts on water resources. Since 2009, Christos is a member of the European Association of Environmental and Resource Economists (EAERE) and a partner in the Water Footprint Network (WFN).

Can the water footprint contribute to integrated water resource management policies?

The water footprint is a consumption based indicator of water use that quantifies the human appropriation of freshwater resources. Unlike traditional water-use indicators which consider only the use of blue water resources within a country, the water footprint accounts for both green and blue water use, as well as the net external water that is flowing in a country in virtual form through imported products. This study assesses the water footprint of crop production and supply utilisation of Cyprus for the period 1995-2009. Using a detailed dataset on climate variables and land use, the water footprint of crop production of Cyprus (internal) is computed through a daily soil water balance model, that captures the effect of climate variability on agricultural (blue and green) water use. The external water footprint is calculated using the values of global water footprint assessments. The results reveal the quantity and type of water footprint, the impact of crop production and consumption on local and global water resources, as well as Cyprus' water import dependency and self-sufficiency. The study concludes by discussing the practical advantages and limitations of such assessments, towards formulating integrated water management policies at a national level.



Mr Anas Zyadin

University of Eastern Finland, Finland

Zyadin gained his 4-year bachelor degree in Forestry and Rangeland Management in 2001. With a prestigious Erasmus Mundus scholarship, Zyadin gained his double master's degree from two reputable European institutes (Wageningen University, The Netherlands) and University of Eastern Finland, Finland) majoring in Forest Management and Nature Conservation in 2007. Zyadin worked 3 years in developing forest plantations in Jordan accompanied by rural development projects in the poor pockets. Now doing PhD at the University of Finland, the objectives are to trigger renewable energy development as a tool for socio-economic development and water security.

On our quest for energy security; have we forgotten water security? - “The dark side of water starvation”

While the developed nations gaze at the de-cocooning of renewable energy development to secure energy supply, curb emissions, and pacify the effects of the sky-rocketing prices of fossil fuels however, other developing nations tearfully struggle to secure a cup of potable water (white gold). Scary yet inevitable, climate-induced events (drought and heat waves) will challenge the world key-organizations to withstand the scream of over 2 billion people without access to clean water. Water starvation is the dark tunnel to conflicts, disputes, civil wars, and even terrorism. The world also forgot that increasing energy production will require voluminous water. In poverty, social chaos will disintegrate any nation's integrity and this chaos may cross borders and spread over other nations. Poverty is said to be one of the reasons for radicalism. Beside Africa, the Near East countries are the most politically instable, the most climately affected countries with the share of water per capita is plummeting dramatically year after year, agriculture is abandoned, more energy is needed for desalination. Considering energy security must get along with water security and therefore, global efforts must gather to establish “World Water Fund” under UN, FAO, and IMF to help the developing countries secure potable water supply before water famine pervade.



European Science Foundation
1, quai Lezay-Marnésia • BP 90015
67 080 Strasbourg cedex • France
Tel: +33 (0) 3 88 76 71 00
Fax: +33 (0) 33 88 37 05 32
www.esf.org