

JDS International Seminar 2016 • Part II, III

Sustainability Policy & Practice

Part II : December 12 and 13, 2016

Part III : January 16 and 17, 2017

Room C501, Natural Science Building C

 *University of Tsukuba*

Japanese Grant Aid for Human Resource Development Scholarship (JDS) Program
Master's Program in Environmental Sciences
Graduate School of Life and Environmental Sciences
University of Tsukuba



www.envr.tsukuba.ac.jp/~jds

Monday, January 16

PROGRAM

9:00-9:05	Opening Remark
9:05-10:35	Special Lecture I Dr. Hubert H.G. Savenije Professor of Hydrology at the Delft University of Technology. "Hydrological Models as Living Organisms"
10:35-10:45	Coffee Break
10:45-12:00	Special Lecture II Dr. Edo Abraham Assistant Professor at TU Delft's Faculty of Civil Engineering and Geosciences "Sustainable Management of Water Distribution Systems Using Model-based Optimization Tools and Renewable Energy"
12:00-13:30	Lunch Break
13:30-14:45	Special Lecture III Dr. Guo Ru Associate Professor, deputy director of the environmental planning and management institute, the College of Environmental Science and Engineering at Tongji University "Climate Change and Low Carbon Development in China"
14:45-15:00	Coffee Break
15:00-15:50	Presentation by JDS Fellows I (Vietnum 5 students) *
15:50-16:00	Coffee Break
16:00-16:20	Presentation by JDS Fellows II (Mongolia 2 students) *

Welcome Reception

* 10 minutes per person, including Q&A

Monday, January 17

PROGRAM

9:00-10:30	Special Lecture IV Ms. Kathy Hodgson-Smith Lawyer, Hodgson-Smith Law “Environmental Law, Biodiversity and Indigenous Engagement in Canada and International Frameworks”
10:30-10:45	Coffee Break
10:45-12:00	Special Lecture V Dr Judy Burnside-Lawry Program Director, Master of Communication, School of Media and Communication RMIT University “Participatory Communication to build community resilience”
12:00-13:30	Lunch Break
13:30-14:00	Presentation by JDS Fellows III (Sri Lanka 3 students) *
14:00-14:30	Presentation by JDS Fellows IV (The Kyrgyz Republic 3 students) *
14:30-14:45	Coffee Break
14:45-15:15	Presentation by JDS Fellows V (Ghana 3 students) *
15:15-15:25	Presentation by JDS Fellows VI (Myanmar 2 students) *
15:25-16:05	Presentation by JDS Fellows VII (Bangladesh 4 students) *
16:05-16:10	Closing Remarks

* 10 minutes per person, including Q&A

Hydrological Models as Living Organisms

Dr. Hubert H.G. Savenije

Professor
Delft University of Technology
The Netherlands



Abstract

Catchment-scale hydrological models that are generally called "physically-based" unfortunately only have a partial view of the physical processes at play in hydrology. Although the coupled partial differential equations in these models generally reflect the water balance equations and the flow descriptors at laboratory scale, they miss essential characteristics of what determines the functioning of catchments. The most important active agent in catchments is the ecosystem (and sometimes people). What these agents do is to manipulate the flow domain in a way that it supports the essential functions of survival and productivity: infiltration of water, retention of moisture, mobilization and retention of nutrients, and drainage. Ecosystems do this in the most efficient way, establishing a continuous, ever-evolving feedback loop with the landscape and climatic drivers. In brief, our hydrological system is alive and has a strong capacity to adjust itself to prevailing and changing environmental conditions. Although most physically based models take Newtonian theory at heart, as best they can, what they generally miss is Darwinian theory on how an ecosystem evolves and adjusts its environment to maintain crucial hydrological functions. If this active agent is not reflected in our models, then they miss essential physics. Through a Darwinian approach, we can determine the root zone storage capacity of ecosystems, as a crucial component of hydrological models, determining the partitioning of fluxes and the conservation of moisture to bridge periods of drought (Gao et al., 2014, GRL). Another crucial element of physical systems is the evolution of drainage patterns, both on and below the surface. On the surface, such patterns facilitate infiltration or surface drainage with minimal erosion; in the unsaturated zone, patterns facilitate efficient replenishment of moisture deficits and preferential drainage when there is excess moisture; in the groundwater, patterns facilitate the efficient and gradual drainage of groundwater, resulting in linear reservoir recession. Models that do not account for these patterns are not physical. If we want our models to correctly represent physics, we need them to represent the landscape as a living organism.

Profile

Professor/Dr. Hubert H.G. Savenije has been Professor of Hydrology at the Delft University of Technology since 1999, where he is the head of the Water Resources Section. Professor Savenije obtained his MSc in hydrology from the Delft University of Technology in 1977. He worked for six years in Mozambique and developed a theory on salt water intrusion in estuaries. He completed his PhD in 1992. In 1994 he was appointed Professor of Water Resources Management at the IHE (now UNESCO-IHE, Institute for Water Education) in Delft. He is an international expert in the field of hydrology of catchments and estuaries. Professor Savenije is also President of IAHS (the International Association for Hydrological Sciences) and editor in chief of *Physics and Chemistry of the Earth*. He is Past-President of Hydrological Sciences of the European Geosciences Union (EGU), and Past-President of the International Commission on Water Resources Systems of IAHS. From 2004 to 2016 he was chief executive editor of *Hydrology and Earth System Sciences (HESS)*, one of the leading hydrological journals that became open access in 2005. He is one of the founding members of WaterNet, the leading education and research network in Southern Africa.

Sustainable Management of Water Distribution Systems Using Model-based Optimization Tools and Renewable Energy

Dr. Edo Abraham

Assistant Professor
Delft University of Technology
The Netherlands



Abstract

Water distribution systems (WDSs) are typically part of an aging infrastructure, which face challenges to efficiently serve a growing population under more stringent economic and environmental constraints. Some of the main operational challenges for WDSs include reducing pressure driven leakage, monitoring and control of drinking-water quality and reducing the cost associated with high energy usage in pumping. In recent years, novel valve technologies and advances in sensor, control, and computing capabilities are enabling the solution these operational problems and associated rehabilitation and design problems.

In this talk, we examine the control of discoloration events in WDSs, which are by far the main cause of customer complaints globally. Since discoloration is mainly caused by the mobilization of particles that have accumulated within the distribution system, we consider the proactive control of flow velocities to maximise the self-cleaning capacity of the drinking WDS. We present a new mathematical framework to achieve this both through an optimal change of the network topology and through an optimal control of pressure control valves during peak demand hours. Another important problem is the reduction of leakage through pressure management. We present a dynamic network management scheme that enables significant leakage reductions. The two objectives of leakage reduction and discoloration potential minimization are also considered in a multi-objective optimization framework. Finally, we consider optimal pump scheduling and how WDSs can be used to provide reserve energy in the balancing of the electricity grid. By integrating pump operations and renewables, we show the potential to reduce greenhouse gas emissions.

Profile

Dr Edo Abraham is an Assistant Professor at TU Delft's Faculty of Civil Engineering and Geosciences. Before coming to TU Delft, Edo was a post-doctoral research associate in the Environmental and Water Resources Engineering Group at Imperial College London. Edo has PhD in Control Engineering and a first class honours MEng degree in Electrical and Electronic Engineering; both received from Imperial College London. His research is motivated by imperatives in urban water sustainability – system resilience, efficient resource utilisation, and water quality management. His current work includes the development of modelling, optimal control, robust estimation and tailored mathematical optimisation and analysis tools to enable smarter water systems. Edo's collaborative research in sustainable development aims to study the interplay of existing intermittent water system management and transition to continuous supply, end-user behavior, microbiological water quality and socioeconomic issues that result in intermittent water systems. Edo is also interested in co-creating capacity in water research of developing urban areas.

Climate Change and Low Carbon Development in China

Dr. GUO Ru

Associate Professor, deputy director of the environmental planning and management institute
Tongji University
China



Abstract

Warming of the climate system is unequivocal. Since the 1950s, many of the observed changes have been unprecedented over decades to millennia. As the biggest emitter in the world, China faces huge challenges under climate change. The extreme weather events in China include large-scale storms and flooding in the east and south region as well as heat and drought in the central, western and northeastern regions. According to the data from the National Climate Center of China, 2015 was the warmest year since 1951.

Based on the concept of eco-civilization, China aims to explore a low carbon development path in response to climate change. In 2015, China announced to peak its carbon dioxide emissions by approximately 2030 in “Intended Nationally Determined Contribution (INDC).” By the end of 2015, China had already accomplished remarkable progress in energy conservation and utilization of new and renewable energies. As a developing country, China is still in the process of industrialization and urbanization. In this presentation, difficulties and challenges in achieving China’s INDC targets are discussed, including the constraint of the energy supply structure, the influence of lifestyle changes, the uncertainty of technology, the lack of investment and capacity, among others

Profile

Dr. Ru Guo is Associate Professor, deputy director of the environmental planning and management institute, the College of Environmental Science and Engineering at Tongji University in Shanghai. Dr. Guo has been closely involved in regional sustainability and climate change science. She has received many research grants, including those from the National Natural Science Foundation Research Grant of China and Shanghai Science and Technology Committee Research Grant. She has published three books and more than thirty academic articles in the field of climate change mitigation and sustainability assessment. Dr. Guo holds a Ph.D. in Environmental Science and Engineering from Tsinghua University in China.

January 16 · Lecture

Environmental Law, Biodiversity and Indigenous Engagement in Canada and International Frameworks



Ms Kathy Hodgson-Smith

Lawyer

Hodgson-Smith Law

Abstract

Indigenous peoples, while diverse and particular in knowledge and culture, share many philosophic and epistemological views in relation to the natural world. Indigenous peoples share common perspectives on the importance of biodiversity to maintain the health of Mother Earth.

Indigenous peoples today are united on many fronts, facing now the immense challenge of loss of biodiversity, changing climate and the resulting impact on traditional livelihoods, health and wellbeing. Indigenous peoples continue to seek redress for dispossession of traditional lands, trying to find an equitable place in contemporary society.

The UN Declaration on the Rights of Indigenous Peoples (UNDRIP) captures some of the aspirations of Indigenous peoples, and the states which adopted it, to move forward with a new perspective. UNDRIP leaves colonization in the past and recognizes those authorities disregarded in historic processes. The full implementation of UNDRIP would advance Indigenous peoples toward their rightful place in modern society, ensuring policies conform and benefit them. A fully implemented UNDRIP would advance Indigenous peoples' interest of self-determination.

In Canada, domestic law recognizes and affirms those Indigenous rights and interests which have survived colonization. These rights are constitutionally entrenched. Canadian law requires the meaningful engagement of Indigenous peoples in environmental protection and management regimes and provide a principled framework for balancing Indigenous and public perspectives when government acts affect Indigenous traditional territories and livelihoods.

This presentation will seek to inform on the state of affairs in Canada in relation to the engagement of Indigenous peoples in climate change and biodiversity protection and identify those cross-cutting issues which form the basis of ongoing work. The Canadian government has announced its commitment to full implementation of UNDRIP, unfolding these obligations in partnership with the Indigenous peoples on a nation-to-nation basis. The international fora continue to provide a meaningful framework for advancing domestic opportunities.

Participatory Communication to Build Community Resilience

Dr. Judy Burnside-Lawry

Program Director
RMIT University
Australia



Abstract

Contributing to the global dialogue on disaster risk reduction (DRR), Dr Lawry will address a key priority for the Post-2015 Framework for Disaster Risk Reduction and Climate related hazards, (HFA2) by describing initiatives used by local governments to increase local-level engagement in order to build community resilience to climate-related hazards. Dr Lawry will present a synopsis of literature from the multidisciplinary areas of communication, social and political theory that examines the role that communication can play in facilitating public engagement to build community resilience. Building on these insights, Dr Lawry will describe modes of communication, quality of dialogue and opportunities for “voice” and “listening” between decision makers and local-level stakeholders that she has observed in her research in Australia, Asia Pacific and Europe, during Disaster risk reduction and climate change adaptation planning. Dr Lawry will differentiate between public information, consultation and community engagement events. Factors that enable and conversely, constrain local-level engagement to build community resilience, and conditions associated with each factor, will be identified and discussed during the workshop. Students will experiment with a unique analytical framework adapted from the dual lenses of participatory communication and information flow models, to differentiate events using one-way information from those offering opportunities for listening, dialogue and genuine engagement.

Profile

Dr. Judy Burnside-Lawry is a Senior Lecturer, and Program Director of the Master of Communication at RMIT University, Melbourne, Australia. She teaches two post-graduate courses, Strategic Communication Management, and Community and Civic Engagement. Whilst communication is Dr. Lawry’s main area of scholarship, her research incorporates social and political science concepts of deliberative democracy to study ‘public participation and inclusive decision making to address environmental challenges’. In 2013, Dr Lawry was awarded the Australian fellowship offered by the European University Institute (EUI), the leading research university in EU political and social studies, to study the quality of participatory democracy during planning for a high speed rail link between Italy and France. Whilst based in Europe, Lawry initiated a relationship with United Nations Office for Disaster Risk Reduction (UNISDR), to examine two European case studies of public participation during planning for disaster risk reduction. She presented a report on ‘stakeholder engagement in disaster risk reduction’ at the 2013 UNISDR meeting for campaign partners and joined UNISDR ‘Making Cities Resilient Campaign 2010-2015’ as a campaign partner.