



IWRA Update

Newsletter of the International Water Resources Association

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MESSAGE FROM THE EXECUTIVE DIRECTOR



Dear IWRA Members, Water Friends and Colleagues,

With eight months to go before the XVth World Water Congress, which shall be held from 25-29 May 2015 in Edinburgh, Scotland; IWRA Update shall be publishing a special series of contributions about the main themes of the Congress. These special publications shall continue

in each edition of the newsletter right up until the Congress. I am also pleased to bring you this edition filled with information about our latest activities and news from our members.

Over the last few months, IWRA President, Prof. Altinbilek and various IWRA staff have had a busy schedule attending meetings and events including Latin America Water Week, World Water Week in Stockholm and the Board of Governors of the World Water Council. I am also proud to announce the publication of our second Policy Brief and the hosting of our second Webinar. This time they were focused on the recent coming into force of the UN Watercourses convention. At the same time, I would like to welcome Mr Scott McKenzie as IWRA's new Webinar Coordinator and Ms. Ellia Guy as IWRA's new Policy Brief Coordinator.

IWRA also awarded the Water Intertional Best Paper Awards for 2013. I warmly congratulate the two winners of the Best Paper Awards, Hans Komakech and Pieter van der Zaag for their paper entitled "Polycentrism and pitfalls: the formation of water users forums in the Kikuletwa catchment, Tanzania"; and Karen G. Villholth for her paper on "Groundwater irrigation for smallholders in Sub-Saharan Africa - a synthesis of current knowledge to guide sustainable outcomes". I also congratulate the recipients of an Honourable Mention: David B. Brooks, Julie Trottier and Laura Doliner for their paper, "Changing the nature of transboundary water agreements: the Israeli-Palestinian case"; and Salman M. A. Salman for "The Nile basin cooperative framework agreement: a peacefully unfolding African spring?".

In order to strengthen good water management around the world, the Toyoko and Hiroshi Hori Education Fund provides support for IWRA memberships for promising scholars from developing economies. I am pleased to welcome and to congratulate the two newest laureates: Mr. Leodinous Mwebembezi, of the Ministry of Water and Environment, Uganda; and Dr. Hans Charles Komakech, of the Nelson Mandela African Institute of Science and Technology, Tanzania. All IWRA members are eligible to nominate candidates for this grant, so if you know of worthy colleagues or individuals, please send a nomination to the IWRA Executive Office!

As we move well into the second half of 2014, IWRA will continue to work on processes for the 7th World Water Forum, where we are leading the Thematic Design Group 3.3 on "Ensuring Water Quality from Ridge to Reef"; as well as contributing to other programmes such as the OECD Water Governance Initiative and the UNESCO/ONEMA led Science-Policy Interface.

Finally, I would like to highlight that the abstract submission date for the World Water Congress has been extended to 31 October 2014. I warmly encourage you to submit an abstract and to contribute to the Congress by mobilising your colleagues and networks.

With best wishes,

Tom Soo



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EXTENSION TO DEADLINE FOR ABSTRACT SUBMISSIONS - XVTH WORLD WATER CONGRESS

The abstract submission date has been extended to 31 October 2014 for the XVth World Water Congress. The association's biggest event shall be held from 25 to 29 May 2015 in Edinburgh, Scotland. We look forward to seeing IWRA members attending.

Visit www.worldwatercongress.com for more information, to submit abstracts and to make the most of discounted member registration fees.



NEW PROJECT OFFICER AT IWRA EXECUTIVE OFFICE

IWRA is pleased to welcome Mr. Pierre Balzergue as Project Officer at the IWRA Executive Office since June. He has a MSc. of Hydrogeology at the University of Montpellier of Science and Technics and a MSc. of International Cooperation at the University of Complutense (Madrid, Spain).

To contact Pierre: office@iwra.org



IWRA'S SECOND WEBINAR!

IWRA held its second webinar on 14 July, entitled "Why does the UN Watercourses Convention entry into force matter?".

The webinar panelists discussed the history and authority

of the UNWC, as well as why it is an important supplement to existing treaty arrangements in many part of the world. The added value that entry into force offers will be explored alongside the necessary steps that should be taken to maximize the benefits of entry into force. Now that the UNECE Water Convention has been amended so that all UN member states can accede to it, the panel also considered the complementarity between it and the UN Watercourses Convention. The webinar was held in conjunction with the launch of the latest IWRA Water International policy brief (see below).

You can download the webinar presentations at:

www.iwra.org/index.php?mainpage=223&page=264&subpage=
If you are interested in IWRA Webinars, we invite you to contact Scott McKenzie at webinars@iwra.org



IWRA WATER INTERNATIONAL POLICY BRIEFING N° 2

IWRA published its second Policy Briefing in July 2014. It is entitled "The UN Watercourses Convention Comes of Age", and follows in the footsteps of the 35th country to accede to the 1997 UN Water Courses Convention and its entry into force on 17 August.

This policy brief is available at: www.iwra.org/doc/IWRA_Policy_Brief_July_2014.pdf

2013 WATER INTERNATIONAL BEST PAPER AWARDS

IWRA Update congratulates the winners of the 2013 Water International Best Paper Awards. From the 2013 issues we had two best papers, and two papers that deserved honorable mention.

Certificates will be given to the winning authors or their representatives at the forthcoming IWRA XVth World Water Congress, to be held in Edinburgh in May 2015.

All these papers have been made available to non-IWRA members for free download on the Water International website at www.tandfonline.com/toc/rwin20. IWRA members have free access to all Water International papers.

BEST PAPER AWARDEES

- Polycentrism and pitfalls: the formation of water users forums in the Kikuletwa catchment, Tanzania
Hans Komakech and Pieter van der Zaag

Catchment forums have to address the reality that river catchments typically cover several administrative districts and have overlapping arrangements of state-led and locally created institutions. Institutional nesting has been proposed to integrate local arrangements. However, the creation of a polycentric or nested governance system raises questions of coordination. This paper describes and analyzes the process of creating a catchment forum in the Kikuletwa catchment in Tanzania. Resolving the problem of administrative boundaries and institutional fit while integrating customary arrangements with the state-led governance structure requires careful analysis of local structures.



Hans Komakech is a lecturer of integrated water resources management and governance at the department of Water, Environmental Science and Engineering, Nelson Mandela

African Institute of Science and Technology, Tanzania;

Pieter van der Zaag is professor of integrated water resources management at the UNESCO-IHE Institute for Water Education in Delft, The Netherlands, and also holds a professorship

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at Delft University of Technology. He chairs the Water Management Group, and is also Head of the Department of Integrated Water Systems and Governance.

• Groundwater irrigation for smallholders in Sub-Saharan Africa – a synthesis of current knowledge to guide sustainable outcomes

Karen G. Villholth

Groundwater irrigation for smallholder farmers in Sub-Saharan Africa is growing in extent and importance. This growth is primarily driven spontaneously by the farmers themselves, spurred by improved access to low-cost technologies for pumps and drilling services as well as market opportunities for produce. This paper presents a review of the current status and knowledge of the prospects and constraints for sustainable and pro-poor groundwater irrigation in Sub-Saharan Africa. Further unlocking the potential of groundwater irrigation for smallholders will require better integrated approaches, simultaneously addressing groundwater-access constraints as well as enabling factors.



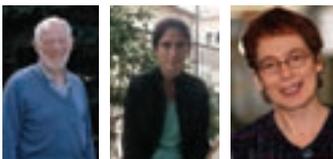
Karen G. Villholth is Principal Researcher at the International Water Management Institute (IWMI), Pretoria, South Africa.

HONOURABLE MENTIONS

• Changing the nature of transboundary water agreements: the Israeli-Palestinian case

David B. Brooks, Julie Trottier and Laura Doliner

This abridged version of the proposal developed for Friends of the Earth Middle East presents the design for an agreement between Israelis and Palestinians to share water in a physically realistic, ecologically sustainable and socially equitable manner. Existing arrangements are, at best, inadequate and, in some cases, counterproductive. The proposal relies upon ongoing monitoring and mediation to achieve equitable and sustainable use. It presents why and how an agreement on water can be reached now, before resolving the full range of issues required in a Final Status Agreement between Israel and Palestine.



David B. Brooks is Research Fellow, Water Conservation and Soft Path Planning, POLIS Project on Ecological Governance, University of Victoria,

Canada; **Julie Trottier** is Director of Research at the Centre National de la Recherche Scientifique, Centre de Recherche Français à Jérusalem, Israel; and **Laura Doliner** is Principal at PrecisionProse Editing Services, Ottawa, Ontario, Canada.

• The Nile basin cooperative framework agreement: a peacefully unfolding African spring?

Salman M.A. Salman

Disputes between Egypt and Sudan on the one hand and the Nile upper riparians on the other hand have dominated the Nile Basin for the last half-century. Nevertheless, there have been attempts at cooperation, and they culminated in the establishment of the Nile Basin Initiative and negotiation of the Nile Basin Cooperative Framework Agreement (CFA).

Ironically, the CFA resulted in solidification of the areas of differences and the emergence of the upper riparians as a power to be reckoned with. This article discusses the areas of difference over the CFA and analyzes its current status and the prospects for cooperation.



Salman M. A. Salman is Fellow, International Water Resources Association (IWRA); Editor-in-Chief, Brill Research Perspectives, International Water Law; and Former Water Law Adviser, the World Bank.

HORI FUND GRANTS FOR SCHOLARS FROM LOW-INCOME COUNTRIES SECOND APPLICATION

The Toyoko and Hiroshi Hori Education Fund provides support for IWRA memberships for promising scholars from developing economies, especially those designated by the OECD as least developed. The first two 2014 applications have been accepted by the Hori Fund Task Force and were awarded to Dr. Hans Charles Komakech (Tanzania) and Mr. Leo Mwebembezi (Uganda). IWRA wishes both of them a very warm welcome to the association!

More information at: www.iwra.org/index.php?mainpage=164&page=230&subpage=

Current members of the IWRA are invited and encouraged to recommend candidates, using the form available on the IWRA website.

CONNECTING WATER KNOWLEDGE AND SCIENCE TO MASS MEDIA

IWRA Fellow Members and Past Presidents, Dr Cecilia Tortajada and Prof. Asit Biswas are regularly contributing to mainstream media. Two of their latest articles on food security in India and drought in China have been published in August 2014 by over 100 media outlets.

Can India feed 1.7 billion people by 2050?

www.business-standard.com/article/current-affairs/can-india-feed-1-7-billion-people-by-2050-114081401033_1.html

Dry reality of droughts in China

europe.chinadaily.com.cn/opinion/2014-08/18/content_18432183.htm

XVth World Water Congress ABSTRACT SUBMISSION

Please note that the abstract submission deadline has been extended to the **31st of October 2014**.

Registrations for the Congress are now open. Become a member and you will be entitled to a great reduction. There are even more reductions if you register early before 31 December 2014!



■ LATEST ACTIVITIES



Latin America Water Week

MEXICO CITY, MEXICO, 23-27 JUNE 2014

Latin America Water Week is a platform for the exchange of experiences and practices between the scientific, business, political and civic commu-

nities of South and Central America, focused on the water challenges and its impact on the environment, energy, health, climate, economy and society.

IWRA's president, Prof. Altinbilek delivered a keynote speech on "Water for Sustainability: The harmonization of human beings and nature".

52nd Meeting of the Board of Governors of the World Water Council



MEXICO CITY, MEXICO, 25-26 JUNE 2014

IWRA President, Dogan Altinbilek and IWRA Executive Director, Tom Soo attended the 52nd meeting of the Board of Governors of the World Water Council. IWRA is a founding member of the World Water Council and is currently

serving on its Board of Governors for the 2012-2015 mandate. At Mexico, IWRA participated in several initiatives of the Council and we had the honour of being addressed by the President of Mexico, H.E. Enrique Peña Nieto.



World Water Week

STOCKHOLM, SWEDEN, 31

AUGUST- 5 SEPTEMBER 2014

The 2014 World Water Week was hosted and organised by the Stockholm International Water Institute (SIWI) in Stockholm. This year's theme of "Energy and Water" took an overall systems view of how we develop and manage energy and water for the good of society and ecosystems – at local, national, regional and global levels - and avoid unintended consequences of narrow sectoral approaches. IWRA President Prof. Altinbilek and IWRA Executive Director, Tom Soo attended the week and participated in many sessions and meetings with various international organisations to further our association's work.

IWRA Executive Board Meeting : September 2014

The IWRA Executive Board held its 6th meeting since it took up its mandate in January 2013. The meeting was held virtually through web-videoconferencing software. Using this technology under the leadership of President Altinbilek, the Executive Board has maintained an excellent participation rate; met more regularly than ever before; and built up consistent momentum to address issues to further develop the association.

■ UPCOMING EVENTS

53rd Board of Governors Meeting, World Water Council

MARSEILLE, FRANCE, 27-28 OCTOBER 2014

Various IWRA Executive Board members and staff shall participate in the 53rd Meeting of the Board of Governors of the World Water Council to discuss IWRA's involvement in the World Water Council and the 7th World Water Forum.

ANEAS Annual Convention & Expo: Water and Energy for the well-being of Mexico

YUCATAN, MEXICO, 10-14 NOVEMBER 2014

This event aims to create a forum conducive to dialogue and inter-institutional linkage. It brings together national and international experts to present strategic solutions for drinking water management, its energy costs and the water requirements for energy generation.

You can visit the official event website at:

www.convencionaneas.com

4th meeting of the OECD-Water Governance Initiative

PARIS, FRANCE, 24-25 NOVEMBER 2014

The OECD Water Governance Initiative is an international multi-stakeholder network of around 100 delegates from public, private and not-for-profit sectors gathering twice a year in a Policy Forum to share on-going reforms, projects, lessons and good practices in support of better governance in the water sector.

OECD Global Forum on the Water- Energy-Food Nexus

PARIS, FRANCE, 27-28 NOVEMBER 2014

The OECD Global Forum on Environment will focus on three areas that can contribute to more integrated policy-making. Topics for discussion will include the need to improve knowledge of the interactions between the different dimensions; how to send the right policy and price signals to users and financiers; and how to plug the nexus into the broader development agenda, particularly in the context of post-2015 discussions.

More information can be found at:

www.oecd.org/fr/environnement/nexus.htm



Africa 2015

MARRAKESH, MOROCCO, 10-12 MARCH 2015

IWRA supports this international conference co-organised by the International Journal on

Hydropower & Dams and the International Commission on Large Dams (ICOLD). International water and energy experts will discuss achievements, opportunities, challenges and development goals for the African Continent, with emphasis on integrated regional development. There will be an update on the PIDA priority projects, with input from the African Union, the African Development Bank, and UNECA.

For more information, consult the brochure at : www.iwra.org/doc/International_Conference_Africa_2015.pdf



7th World Water Forum

DAEGU & GYEONGBUK, REP. OF KOREA,

12-17 APRIL 2015

The organisation of the thematic sessions of the World Water Forum went a step further this month as each thematic leader sent session proposals to the Forum Thematic Process Commission. IWRA is participating in processes involving several themes, including Green Growth, IWRM, and the Science-Policy Interface.

In particular, IWRA is leading the Design Group of theme 3.3 «Ensuring Water Quality from Ridge to Reef».

There are 5 sub-themes:

3.3.1 Water Quality: Smarter Use for Water Security

3.3.2 Monitoring and Reporting of Water Quality

3.3.3 Strengthening Frameworks for Governing and Managing Water Quality

3.3.4 Sustainable Wastewater Management and Reuse

3.3.5 Managing sources for coastal and marine water quality improvements

If you are interested in contributing to the process, please contact the IWRA Executive Office at: office@iwra.org

For more information about the Forum, visit the official website at: eng.worldwaterforum7.org/



XVth World Water Congress in the Media

An interview with Mr Jon Rathjen (Chair of the National Organising Committee of the World Water Congress; and Team Leader- Water Industry at the Scottish Government) was published online in Ooska News on 11th September:

www.ooskanews.com/story/2014/09/scotland-prepares-host-iwra-s-world-water-congress_162153



SPECIAL SERIES ON THE THEMES OF THE XVth WORLD WATER CONGRESS

Eight months from the XVth World Water Congress, IWRA Update is launching a special series focusing on the major themes of the event. The Congress has always been at the cutting edge of placing important emerging thought on the international stage, and the XVth Congress is proudly upholding that tradition.

The main theme of the Congress is:
**Global Water, a resource for development:
Opportunities, challenges and constraints**

The subthemes are:

- Global challenges for water governance
- Revisiting water paradigms
- Non-conventional sources of water
- Valuing water: monetary and non-monetary dimensions
- Water allocation among competing uses and users
- Management of water resources
- Key vulnerabilities and risks
- Transboundary river basins and shared aquifers – the end of the conflict discourse?
- Water law at the national and international levels

This special series shall cover each of the Congress themes, with the next 3 editions of IWRA Update each showcasing a selection of the Congress themes through the perspectives of members of the International Scientific Committee and the National Organising Committee. To kick this series off are two articles on the themes of “Global Water: a resource for development” and “Valuing water: monetary and non-monetary dimensions”.

complex. In a race to promote the economic growth that is able to sustain human development, inexplicably, people themselves have been pushed from the centre of development debates and dialogues to the periphery, losing many times the irrefutable priority governments should have awarded in the search for progress.

Water has proven to be an indispensable component in the quest for human development. Its fundamental role in the energy, agriculture and environmental sectors has, finally, been acknowledged, and discussions and debates on the newly discovered “nexus” start enriching policy deliberations. These discussions have reached the World Economic Forum with the perception-based Global Risks Map identifying the water-energy-food nexus as one of the main top risks in 2012.

Discussions on water policy, management, development and governance abound. About efficient water management, it has been said that it is crucial for social stability, economic growth and environmental sustainability. In a



GLOBAL WATER: A RESOURCE FOR DEVELOPMENT

CECILIA TORTAJADA

Institute of Water Policy, Lee Kuan Yew
School of Public Policy and past President,
International Water Resources Association

As populations have grown, human needs have increased and expectations have changed, the natural environment that supports growth has deteriorated and the challenges faced by governments and societies have become more



fast changing environment, countries seem to be progressing slowly compared to their needs. Decisions sit at the crossroads of multiple areas of national priorities and also donors' interests making them extremely complex to take and also to implement.

The objective of the next Edinburgh IWRA Congress is thus to discuss water as a global resource for development considering old and new driving forces and trends and sharing findings and insights, goals and aims and also involving the different partners that influence decision making in the water and others' sectors. Topics for discussion include, but are not limited to, impacts of increasing urbanisation; water, land and energy resource constraints; insufficient infrastructure as well as aging one; water pollution as one of the main threats of the 21st century with emerging contaminants playing a main role; reused wastewater as an invaluable resource with distinct potential for direct and non-direct potable use that may make possible to expand water supply sources through reuse of municipal wastewater, etc. Equally important are the still not fully understood extreme weather events and potential impacts of climate change. Last, but not least, are the expectations of the global public whose needs and opinions are being heard increasingly louder all over the real and virtual worlds.

The Congress also provides a forum to discuss the multiple inter-linkages between the water, energy, agriculture and environmental sectors for growth and development; the impacts of resource use patterns and trade activities; and the understanding of the interdependencies between the several sectors on national economies, all of which are critically important for overall development and economic and social growth. In spite of their importance, the related complexities of these issues are still neither fully understood, and many times nor properly appreciated, and thus not planned for. The end result has been that, in most countries, the national policy frameworks that should be able to address the present and future development challenges in a comprehensive manner, are still not adequately formulated. The IWRA Congress aims at encouraging discussions that fill this gap.

A main topic is also that of water as a non-traditional security issue. Water scarcity and pollution threatens the ability of the countries to

provide resources in appropriate quantity and quality for economic, social and environmental uses which may have direct and indirect impact on their overall development in the short, medium and long-terms.

The increasing vulnerability of water resources due to highly variable precipitation levels, over-exploitation, mismanagement, degradation and increasing competition between uses and users (including growing domestic water supply, energy and food demands and environmental needs) among others is having profound impacts on economic development and thus on wider traditional security concerns. Historically, it was considered that water security was largely determined by actions taken at the local or national scales such as non-effective institutions, non-implementable policies, laws or regulations or inefficient management practices. Nevertheless, it is being increasingly realised that global changes, and now development needs of both developed and emerging economies (or the so-called Global North and Global South following the new discourse), have serious impacts not only on their own economies but also on third countries in both uncertain and unexpected ways.

Vital to efficient management is the governance component: how decisions are taken, who articulates them, who contributes and who is absent. While it is said that all actors are relevant and all should participate, there seems to be some reluctance by the development and also the academia communities to involve private sector in spite of its growing and fundamental role in development.

During the IWRA Congress, we are looking forward to discuss nexus not only among the water, energy, agricultural and environment sectors but also encourage nexus among public, academia, research and private sectors. World needs are so complex that contributions of every actor or partner in development are welcome and the private sector is likely to bring meaningful contributions to the discussion tables as well.

The roles of the private sector have progressed from being a product or a service provider, to a development partner and now as a potential engine for socio-economic development and environmental protection. A growing number of mostly multinational companies are embracing sustainability policies and practices as in-

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tegral components of their businesses models that are relevant to discuss. Companies still aim to achieve the normal continuous profitability and growths goals but many are also looking to concurrently create social and environmental benefits in the communities within which they operate. Out of necessity, but also acknowledging the values and benefits of working with local, regional and international non-governmental organisations, many private sector groups have now developed partnerships with different actors at different scales. Partnerships with academic institutions are also increasing both in developed and developing countries. There is a growing body of evidence-based research that assesses and documents the impacts of companies in the social, economic and ecological environments within which they work.

At the Edinburgh IWRA Congress, discussions are encouraged on all the above topics with the aim to contribute to the understanding of the global water resources as a resource for development. ●

The Hydro Nation challenge is to place Scotland as a world leader in:

- (I) the governance of water resources, partnering with other nations in developing their water governance framework;
- (II) the performance of its water industry and its transformation to low-carbon sustainable approaches;
- (III) the role that its research community takes in international research programmes; and
- (IV) the value of its water resources for the economy.

As part of this challenge, the Water Resources (Scotland) Act (2013) places a legislative duty on Scottish Ministers to:

- (A) take such reasonable steps as they consider appropriate for the purpose of ensuring the development of the value of Scotland's water resources, and
- (B) do so in ways designed to promote the sustainable use of the resources.

To deliver against the overarching vision, and help Ministers meet their duties under the Act, a wide-ranging and evolving Hydro Nation agenda supports activity which seeks to add value to Scotland's water sector, contributes to Scotland's attractiveness as a place to do business, and the development of stronger national and international networks of industry and academic expertise to support development, innovation and efficiency. The Hydro Nation Forum² has been established, comprising key sectoral experts, to help develop and deliver the Hydro Nation vision and a strategic work plan underpinning the strategy.

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'VALUING WATER: MONETARY AND NON-MONETARY DIMENSIONS' - THE ROLE OF ECOSYSTEM SERVICES IN MEETING SCOTLAND'S HYDRO NATION CHALLENGE

JULIA MARTIN-ORTEGA and ROBERT C. FERRIER (The James Hutton Institute)
JON RATHJEN and BARRY GREIG (Water Industry Team, Scottish Government)



The Hydro Nation Challenge and the Water Resources (Scotland) Act 2013

The Scottish Government is working to deliver against its vision of Scotland as the world's first 'Hydro Nation'. This is defined as a nation that recognises the importance and value of water within its national and international identity and manages its water environment to the best advantage, employing knowledge and expertise effectively at home and internationally in ways which contribute to a flourishing low-carbon economy¹.

The role of ecosystem services

In 2012, Scotland's Centre for Expertise in Waters (CREW), an independent government-funded 'knowledge hub' supporting the Hydro Nation initiative, summarised current academic perspectives and evidence on the value of water resources in Scotland to support the development of the Act³. This analysis highlighted that freshwaters not only provide society with goods that are critically important to human wellbeing, such as clean water and energy, but also other services that are less tangible but equally important to humans. For example, water environments support recreational activities and they have great cultural significance. Moreover, natural hydrological



processes underpin flood protection, flows can dilute the impact of polluting activities, and the different forms of water bodies support diverse wildlife and biodiversity. All these benefits are the so-called 'water ecosystem services'.

The way nature works and delivers services is complex, and often generates trade-offs. This means that not all services can always be realised at the same time. Moreover, changes in the condition of freshwaters can lead to significant changes in how ecosystems function, which in turn affects the provision of these services and the associated benefits. Water ecosystem services are threatened globally by climate change, abstraction, pollution, invasion of alien species, land conversion and agricultural practice.

In Scotland, there has been considerable change in ecosystems and the services they provide over the past years. The delivery of some services, such as the provision of food and energy has increased considerably. However, other ecosystem services have been negatively impacted (e.g. habitat loss and changes in nutrient storage and cycling)⁴. Understanding the value that society places on water ecosystem services is necessary to make optimal decisions about their current and future use and conservation.

The predominant framework used to interpret and measure the value of ecosystem services is that of neoclassical economics, which associates wellbeing with human welfare measured in monetary terms. A range of methods have been developed to estimate the monetary value of water ecosystem services, such as hydro-power, angling, flood risk mitigation and recreation, as well as 'non-use' values (related to the mere existence of an ecosystem or asset)².

Monetary valuation does not mean putting a 'price' on water, but using monetary units as a metric to measure the welfare or benefits associated with natural resources. The advantage of measuring value in monetary terms is that it allows comparison of the benefits associated with water ecosystem services with the costs of land and water management interventions, providing economic efficiency criteria for decision-making. However, many criticise this approach, arguing that the reality of human wellbeing is more complex than just money and voicing moral concerns about the risk of monetary valuation reducing nature to

a tradable commodity. Acceptance that not all values can be monetised is gaining consensus and alternative, non-monetary frameworks that try to quantitatively or qualitatively analyse the value of natural resources are being developed.

The evidence provided by the CREW analysis resulted in the amendment of the Act in its final parliamentary stage through which it was established in statute that 'the reference to the value of water resources:

(A) means the value of the resources on any basis (including their monetary or nonmonetary worth),

(B) extends to the economic, social, environmental or other benefit deriving from the use of the resources', i.e. to the full range of ecosystem services.

Challenges ahead

The challenges for the development of Scotland's vision for water ecosystem services relate to two broad areas⁵ - the valuation of ecosystem services, and how those values are used.

How to accurately assess the value of water ecosystem services

Although monetary valuation is well established as an academic discipline, methodological boundaries impose limitations for 'real-life' applications. The critical challenge lies in the development of models capable of reflecting the natural process of service delivery, and how to link this to the way people perceive and value those services. Valuation needs to be based on ecological indicators, but there is a degree of uncertainty about the outcomes of water interventions in terms of 'final ecosystem services'. To deal with this obstacle, valuation techniques need to account for ecological spatial issues, time lags, risks and uncertainty. Moreover, applying valuation techniques is expensive, so cost-effective alternatives are needed. Furthermore, current research on the assessment of non-monetary values needs to be continued, for example, on issues related to equity and plurality of values (e.g. Whose values need to be considered? Individual values? Shared and collective values? What role do different world views play in the formation of values? etc.).



How to 'use' the value of water ecosystem services

Methods for incorporating non-market values into cost-benefit analysis have been developed. But these become more complex when additional issues such as distributional effects and equity considerations need to be incorporated. For example, evidence suggests that the implementation of the European Water Framework Directive might be beneficial for society overall, but that it places most of the cost-burden on the agricultural sector⁶. Further investigation is also required into how best to link ecosystem services values into green accounting frameworks (such as the ones currently being promoted in Scotland⁷), particularly in relation to incorporating less tangible services, such as flood regulation or cultural values. Additionally, it is recognised that further work is needed on how to include non-monetary values in decision-making frameworks and indices of prosperity as well as considering the consequences of mainstreaming monetary values of ecosystem services in policy (e.g. commoditization of nature, conflicts between different world views).

What does this mean for Scottish water policy and industry?

Scotland's Hydro Nation Strategy represents one of the first examples of the incorporation of the notion of 'value' of water resources into legislation. This clearly opens new avenues for developing new approaches to water management and conservation. However, the Act is not specific about mechanisms and how the notion of water value is going to be developed in practice. Current research funded by the Scottish Government (through CREW), is looking into how to operationalize the notion of value (monetary and non-monetary) of water ecosystem services. This includes: I) identifying the legal and policy barriers and opportunities for the development of mechanisms such as Payments for Ecosystem Services, Benefit Sharing Mechanisms and community partnerships; II) identifying the views that different stakeholders have on the notion of value; III) reflecting on the forms in which non-monetary valuation can be incorporated into policy-making; and IV) reflecting on potentially 'perverse' consequences of developing the notion of monetary values of ecosystem services in water policy and management.

Conclusions

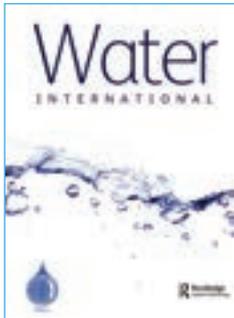
As witnessed by the pollution of waterways, the depletion of aquifers and the degradation of wetlands, the pressures on the planet's water resources are already significant. With growing human populations, aspirations of increased economic growth and the impacts of climate change, these pressures are likely to increase for the foreseeable future. Scotland has taken up the challenge of leading in the generation of knowledge in relation to valuing water in its pluralistic dimension, to help address these challenges. Now it is important to make sure that this knowledge production effort remains meaningful, critical and purpose-driven. ●

References

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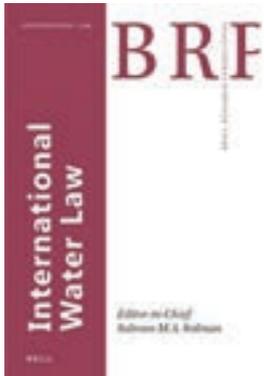
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Brill Research Perspectives, International Water Law

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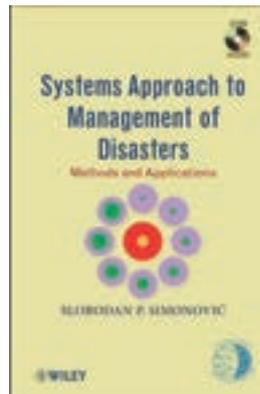
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Submissions should be sent to Salmanmasalman@gmail.com or to Jason Prevost at Prevost@brill.com



Prof. Simonovic visited Tongji University in Shanghai (end of May) to attend the celebration of publication of his book «Systems Approach to Management of Disasters - Methods and Applications» in Chinese language. The celebration organized by Prof. Chuangfeng HAN, Professor of Tongji University and translator of the book was attended by the University dignitaries (including the Vice-President of the University), guests

from the Chinese Academy of Sciences, University and government, and graduate students.

The Chinese version of the book is published by and available from the Science Press www.sciencep.com. The English version of the book, published in 2011, is available from Wiley and Sons ca.wiley.com/WileyCDA/WileyTitle/productCd-0470528095.html. The video from the Shanghai celebration (in Chinese) is available at www.youtube.com/watch?v=KEIrFmCWft0

Two articles from our members:

- Donoso, G. O. Melo y C. Jordán. 2014. «Estimating water rights demand and supply: Are non-market factors important?» *Water Resources Management*: 28 (12): 4201-4218. (ISI), (DOI) 10.1007/s11269-014-0739-3.

Full article is accessible at: link.springer.com/article/10.1007%2Fs11269-014-0739-3

- Alex Taylor, Alicia Flatt, Marc Beutel, Morgan Wolff, Katherine Brownson, Paul Stamets. Removal of *Escherichia coli* from synthetic stormwater using mycofiltration. *Ecological Engineering*, Elsevier, June 2014.

Article can be found at : www.sciencedirect.com/science/article/pii/S0925857414002250