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Call for papers

Exploring the dynamics of water innovation

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1. Call for papers for a special volume of the Journal of Cleaner Production

Access to water is a human right and essential for meeting basic human needs. Furthermore, water is indispensible for agriculture, healthy ecosystems and all industrial processes and, therefore, for economic development. Yet the water sector, particularly in developing countries, is facing enormous challenges due to climate change, rapid population growth, rising demand for water, increasing pollution of sources leading to ever more insecure water resources (ADB, 2013; UNESCO, 2012, 2014; Deloitte, 2012). To address these challenges, innovation is crucial. This Special Volume (SV) is based on the realization that these are substantive reasons for examining, in detail, how water-related innovations are generated, diffused and applied and, based on an improved understanding, how these processes can be fostered by overcoming obstacles and bottlenecks to water innovation.

The importance of water-related innovations has been realized by policy makers in recent years and is evident by its increasing inclusion in policy and research agendas and international fora, e.g. the water-related challenges addressed in the Horizon2020 programme, the Strategic Research and Innovation Agenda of the Strategic Forum for International Science and Technology Cooperation of the European Commission and Member States, the European Innovation Platform on Water (EIP Water), the Joint Programming Initiative of EU Member states on Water (JPI Water), the Water supply and sanitation Technology Platform (WssTP) and the inclusion of the science, technology and innovation theme for the upcoming 7th World Water Forum in 2015. The discussion on how to foster innovation, however, is still characterized by an absence of robust data analysis across Europe. Still, Europe is acclaimed to be a leader in water-related knowledge, technology and innovation but in general, the water 'sector' has the image of being less dynamic and innovative than other sectors. According to Ipektsidis et al. (2014) aggregated figures of innovation and R&D intensity in the water sector are significantly lower compared to other sectors, the sector is highly consolidated, with a few large firms dominating the national European markets, and with stagnated employment over the last decade. These characteristics are typical for sectors that are traditional, with a low innovation rate, focussing on process and incremental innovation, thus implying that the sector lacks innovation dynamism.

A recent study by the OECD (2014) on the invention and international diffusion of water quantity-related technologies based on patent data found that: i) although innovation activity in water-related technologies has been increasing over the last two decades, the growth in such technologies over the last two decades has been disproportionately concentrated on supply-side technologies; 2) over 70% of innovation worldwide happens in countries with low or moderate vulnerability towards water scarcity, implying that (with the exception of Australia, Spain and Israel), countries with severe water issues do not appear to specialize in water-related technologies; and 3) some countries with large water resources, such as Switzerland or Norway, nevertheless appear as significant markets for water-efficiency technologies.

A previous study on water pollution abatement and control technologies identified (including wastewater treatment techniques – primary (mechanical), secondary (biological) and tertiary (chemical) treatment technologies) showed that Germany and the US have historically been the major innovators, with Japan taking the lead more recently. Moreover, it noted that the rate of growth of this type of innovation in Korea and especially in China had increased, four-fold during the period 1999-2004, in contrast with the developments elsewhere, with patent counts for most of the large innovating countries actually decreased (OECD, 2011).

We argue that these aggregated statistics may not be capturing the actual dynamics of water innovation. To begin with, non-R&D innovation, i.e. innovation that is not measured in terms of R&D and/or patents, is not included. Yet field experience suggests that many incremental technological as well as non-technological innovations are happening (e.g. NEA, 2014). According to the European Commission's Innovation Union Competitiveness report, water innovation dynamics are less driven by market demand and competitiveness and more by regulation and social and environmental factors (European Commission, 2014; p.275). Moreover, the European Innovation Platform on Water has identified a number of barriers and obstacles that are perceived to hamper water-related innovations and has prioritized them into the following categories: a lack of funding and financial flows for innovation into the sector (as is the case for many other sectors), b. risk aversion, c. lack of demonstration sites, d. inconsistencies and fragmentation of policies and

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regulations, e. sector fragmentation in terms of responsibilities and resulting conflicts, and f. conservative procurement procedures restricting innovative solutions (EIP Water 2014). Similarly, an online platform focusing on innovation in the water and construction sector in the Netherlands identified bottlenecks such as risk aversion, legislation and regulations (culture and procedures), competencies and scattered knowledge, a focus on return on investment, a lack of urgency as well as missing room for experiments. Next to diverse case studies, the platform also provides a learning environment on how to overcome barriers to innovation (www.snellerinnoveren.nl). Yet neither of these two approaches (the online platform and the EIP Water) has relied on a sound scientific approach for identifying bottlenecks and barriers as well as opportunities for water innovation. Although, the figures and experiences detailed in the foregoing references to the European landscape, based upon several sources from international organizations, report similar trends in other parts of the world (e.g. OECD, 2012; ADB, 2013).

Relevant theoretical bodies of literature, i.e. studies of innovation systems and the diffusion of innovations, have covered many (competitive) industrial and manufacturing sectors to examine the multitude of factors that affect innovation (e.g. Montalvo, 2006; Etzkowitz, 2003). However, with a few limited exceptions (e.g. Hegger et al., 2011; Krozer et al., 2010; Lobina, 2012; Mvurliwenande et al., 2013; Peuckert, 2012; Partzsch, 2009; Wehn and Montalvo, 2014), this body of knowledge has not yet included water-related research. Partly this is also due to the predominantly sectoral focus of such studies. Defining 'the water sector' is problematic and has been questioned by prominent institutions (e.g. UNESCO, 2012). This is also evident by various sector classifications that typically define water supply (and sanitation) in detail (e.g. NACE, SIC) but refer to other water-related activities (e.g. irrigation, hydropower, river transport, flood defenses) to other classifications (such as agriculture, energy and transport). Moreover, activities regarding resilience to water-related disasters are absorbed (and thus hidden) under humanitarian aid.

The cross-cutting nature of water as well as the urgent need to address the water-related challenges means that a discourse about water innovations is required to better inform and support the generation and diffusion of water innovations. The intention of this Special Volume is to bring innovation to the forefront of water studies and education, and, to examine how the generation, diffusion, adoption and use of such innovations can be fostered. This Special Volume will be a first effort to integrate the emerging insights regarding water-related innovations, both technological and other forms of innovations. As such, it presents an important advance in the effort to bridge water- and innovation-related research. The coherence of the papers in this Special Volume will stem from the fact that the papers will be drawing on the established literatures and theories in the field of innovation studies and applying them to the study of water innovation.

2. Topical areas

This Call for Papers (CfPs) for a SV of the Journal of Cleaner Production (JCLP) provides an opportunity for scholars, practitioners, NGO leaders and governmental officials to work together to reach better understanding of ways in which water-related challenges can be addressed by innovation. The prospective authors are challenged to determine the factors that need to be analyzed in order to catalyze water innovation, particularly in preparing appropriate innovation policies to address water-related challenges. This CfPs was designed to attract papers that document the application of innovative concepts and frameworks, policies, methods, processes, and results that are relevant to further our understanding of water innovation dynamics.

The Editorial Team of this SV invites authors to prepare and submit papers that include, but are not restricted to, the following broad topics:

Generation and application of water–related innovations: Existing research in innovation studies has stressed the importance and advantages of gaining access to knowledge external to the firm or organization (Contractor and Lorange, 1988; Chesbrough, 2006; Laursen and Salter, 2006; Bell and Pavitt, 1995; Bell, 2009). Papers on this topic should address how water-related innovations are developed and fostered within and across value-chain networks. Authors are invited to investigate what hampers the diffusion and utilization of water innovations and what can be done to overcome such impediments.

Water–related R&D and innovation and structural change: The Editorial Team is also interested in indicators, tools and methods that can be/are being used to measure water-related R&D innovations and to analyse sources of structural changes and their impacts on competitiveness, employment, productivity, economic performance in helping to ensure equitable, short and long-term water security.

Water innovation systems (learning, innovation and competence building systems): Innovation systems research has evolved during the last three decades through seminal works by Freeman (1987), Nelson and Winter (1982) and Lundvall (1992), which consider the development and implementation of innovations as a process of interactive learning that improves the competencies of actors so that value of socio-economic benefits for society can be created from knowledge. Innovation systems research has recently been extended to addressing questions of development and has begun to apply the ***'innovation system concept'*** to developing countries (e.g. Lundvall et al., 2009). In this context, papers for this SV should focus on the learning, innovation and competence building systems for distinct focal areas (e.g. water for production and hydropower, urban and rural water supply and sanitation, water resources management, water-related disasters).

National strategies for water–related innovations and capacity development: The inefficiencies apparent in the management of water resources are often attributed to inadequate human, organizational or institutional capabilities and to a lack of innovation capabilities. Recent international events on 'Capacity Development for the Water Sector' have highlighted the need for national strategies to strengthen water-related capacities and capabilities in a coherent and coordinated way and through a comprehensive and harmonized approach (e.g. Wehn de Montalvo and Alaerts, 2013). Papers for this SV that report on and analyse experiences with developing, strengthening and implementing such strategies are welcome.

Skills, organisational learning and knowledge management for water innovation: Similar to organisations in other sectors, water organisations rely on a sound knowledge base to sustain and improve their performance through change and innovation, yet this is often lacking, particularly in developing countries (Wehn de Montalvo and Alaerts, 2013). Knowledge management consists of individual and organisational learning for ensuring an organisation's productivity, adaptation and competence. Managing these learning processes to ensure that they result in the (improved) application of knowledge by individuals and in collective changes such as improved organisational routines and procedures, as well as innovation, is crucial. Papers should explore how these processes differ from organisational learning and knowledge management in other areas and how they can be effectively addressed.

Water–related social innovation: Social innovation approaches are based upon relying on innovations to (primarily) address societal challenges to deliver improved quality and

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quantity of life, rather than economic profit. This innovation process is considered to be both a process and an outcome. Some authors have emphasised that the processes of social innovation are 'self-conscious collective actions, which are designed to address the unsatisfied need for sustainable development' (Mehmood and Parra, 2013). Papers for this SV could be those which focus on water-related social innovations designed to address aspects of water security as conceptualized by the OECD (2013) or the ADB (2013).

Inter-sectoral dynamics of water–related innovation and knowledge flows: Typically, innovation studies focus on a single sector. Concepts such as the 'water, energy, and food nexus' are gaining currency in order to understand and address the complexity of inter-sectoral dynamics. This topic is a challenge to authors to address the complexity of inter-sectoral innovation and is concerned with water-related innovations at the nexus of water-energy-food. Here the interoperability of technologies, institutions and networks are of special interest.

Implications of Information and Communication Technologies (ICTs) for water: The pervasive characteristics of ICTs have caused them to be considered to be a technological paradigm, affecting, disrupting and changing all sectors of the economy (Freeman and Perez, 1986). The effects for water-related activities are likely to extend much beyond current improvements in sensing, monitoring and smart metering, citizen observatories, hydroinformatics and modeling. Digitization will continue to affect processes related to the management of water quantity and quality. Authors should consider potential parallels to the Industry 4.0 developments that are reshaping other sectors (i.e. the combination and convergence of sensor technologies and robotics transforming industrial systems and manufacturing). They should pay particular attention to the implications in terms of the quantity and quality water-related employment opportunities (i.e. changes to relevant knowledge, skills and capabilities).

Please note: The topical areas that authors may address for this Special Volume are not limited to those referred to in the above list. This volume intends to engage academics, policy-makers, corporate leaders, managers, NGOs and other practitioners in developing manuscripts in the dialogue on the dynamics of water innovation, identifying ways in which water-related challenges can be addressed by innovation, determining the factors that need to be analyzed in order to catalyze water innovation, and considering appropriate innovation policies to address water-related challenges. The Team therefore, welcomes traditional academic papers (e.g. based on original research using comprehensive literature reviews, theoretical frameworks, empirical studies, including case studies) as well as practitioners' and policy makers' accounts.

Tentative schedule

October 2014	Publication of the Call for Papers for this SV
January 31, 2014	Submission of Abstracts (400–500 words) to Dr. Uta Wehn (u.wehn@unesco-ihe.org) and Dr. Carlos Montalvo (carlos.montalvo@tno.nl)
February 15, 2015	Response from Editorial Team - Invitation to submit full papers
June 15, 2015	Submission of full papers ('peer-review ready') via the EES system. Please select Article Type: 'Water and Innovation'
June 15 to August 30, 2015	Peer review process – Provide feedback to authors
October 15, 2015	Submission of revised papers
November 30, 2015	Second round of reviews finished
January 15, 2015	Final papers (corrected proofs)
March 1, 2016	Publication of SV

3. Contributions

Full papers are invited for potential publication in this SV of the JCLP. Submissions should be between 9000 and 13,000 words for comprehensive reviews, between 7000 and 8500 words for full research/theoretical papers with broad empirical studies and between 4000 and 5000 words for case studies. All should be developed based upon the editorial and formatting guidelines provided in the instructions for authors for the JCLP, which can be accessed from the website: http://www.elsevier.com/wps/find/journaldescription.cws_home/30440/authorinstructions.

Upon receipt of the completed documents, three to six independent reviewers will be selected to provide peer reviews for each document. Upon receipt and acceptance of the author's revised or re-revised documents, all documents will be published in this SV of the JCLP titled: 'Water and Innovation'.

Authors with limitations in the command of written English are recommended to have their papers edited by a ***'Native English Science Editor'*** before the first submission because poorly written pieces can compromise the decisions during the review process. Similarly, they should have their final document edited by a ***'Native English Science Editor'*** before they submit it to Elsevier.

By submitting a manuscript, author(s) certify that the contribution is original and has not been published or is under consideration for publication elsewhere and that no part of the material breaches the right of others. The editors will first evaluate all articles in order to assure suitability with the scope of both the SV and the JCLP. After this first screening, suitable papers will be submitted to the single-blind peer review process according to the standards of the JCLP.

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