Leadership in knowledge and capacity development in the water sector: a status review

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Abstract

Water management is particularly dependent on strong capacity, a solid knowledge base and awareness at all levels, including those of the individual, the organization, the sector institutions and the ‘enabling environment’. Yet getting all levels to operate in a coherent manner is challenging, and requires vision and leadership. This special issue seeks to further the understanding of leadership in knowledge and capacity development in the water sector but its theoretical and methodological insights will be of interest beyond that arena. This paper presents an introduction to the special issue which resulted from selected papers presented at the 5th Delft Symposium on Water Sector Capacity Development held in Delft, The Netherlands. Collectively, the contributions examine knowledge and capacity development in both the water services and water resources sub-sectors. In order to be linked well to current local realities, the papers rely on both academic analyses based on empirical research as well as practitioners’ accounts based on their professional experience. Together, the papers in this special issue and the insights from the recent Symposium summarized in this editorial introduction present an overview of the current state of the art in knowledge and capacity development in the water sector. The paper raises salient policy implications and outlines a research agenda for knowledge and capacity development in the water sector and beyond.

Keywords: Capacity development; Knowledge; Leadership; Learning; Policy implications; Research agenda; Water sector

1. Introduction

Water security has become an imperative for economic prosperity, environmental sustainability and social inclusion. Climate change, rising demands for water and increasing pollution are leading to ever more insecure water resources, threatening sustainable development. These trends challenge our water resources management and require strong human, organizational and institutional capacity to understand and address them.

Water management cuts across many sectors and is highly distributed – everyone contributes to it, one way or another, by consciously or not so consciously taking decisions to use, pollute, save or waste water,
on a daily basis. Yet everyone’s health and wealth and very survival depend on water security. This is intrinsically different from, for example, our dependency on transport or energy. Water management is therefore particularly dependent on strong capacity, a solid knowledge base and awareness at all levels, including those of the individual, the organization, the sector institutions and the ‘enabling environment’. Yet getting all levels to operate in a coherent manner is challenging and requires vision and leadership. Moreover, as the demand for reliable, good quality water continues to increase, the connectivity and competition between the different water using sectors become more apparent, e.g. between water supply, energy and food production. More resilient approaches are needed that are integrated and adaptive to secure the availability of water resources for the various users. Similarly, as countries adopt ‘green growth’ and ‘blue sustainability’ policies, they will need to leverage existing capacity with innovation and strong leadership to rise above traditional sectoral boundaries and combine globally accessible knowledge (with regard to clean technologies, eco-innovation, best practices, etc.) with local knowledge (of how people want to shape their community). Preparation for the future demands policies as well as communication and implementation arrangements that are knowledge-driven. Yet many public administrations responsible for water seem not to appreciate this challenge and, admittedly, our understanding of how to boost such knowledge and capacity is still modest.

Over the last three decades, development policy has evolved from financial support for straightforward infrastructure investments to technical assistance and, now, to the full recognition of the importance of knowledge for development. Multilateral development banks and bilateral development agencies are now funding numerous capacity development projects, and rely on stronger capacity in the countries to achieve more effective and sustainable development. Yet, in practice, it remains challenging to strengthen knowledge and capacity across the board, in multiple government institutions, civil society, the private sector and knowledge institutes.

Similarly, our understanding of capacity has evolved from narrow conceptualizations of capacity, with a focus on individuals or organizations (see Lusthaus et al., 2002), to an understanding that appreciates the systemic and multidimensional nature of capacity, focusing on the ability of human systems to perform, survive and self-renew (Morgan, 2006). In the context of the water sector, Alaerts & Kasperma (2009: 8) have defined capacity accordingly as ‘the capability of a community or a society to identify and understand its development issues, to act to address these, and to learn from experience and accumulate knowledge for the future’.

It is now commonly accepted that knowledge and capacity need to be conceived and addressed at several distinct, yet interconnected, levels of: (1) individuals (with their knowledge, experience, skills and attitudes); (2) organizations (operating through procedures, routines, knowledge management and incentive systems); (3) sector institutions and the ‘enabling environment’ (the legal, fiscal, policy and administrative frameworks); and (4) civil society (the collections of groups and tax payers with their cultures, ambitions, votes and values). Levels 2 and 3 together largely cover what is also referred to as institutional capacity (the rules, norms and values that govern the behaviour of people and organizations).

While originally often used synonymously with education and training, capacity development – along with the growing appreciation of the complexity of capacity and its systemic nature – nowadays entails a large toolkit of different types of interventions that aim to foster the knowledge base and the capacity of individuals and institutions by creating learning opportunities and assisting with the generation and acquisition of new knowledge. These interventions can consist, for example, of formal (basic and higher) education and distance learning, off-the-shelf and tailor-made training courses, e-learning systems, a wide array of experience-based learning (such as action learning and coaching, mentoring
and apprenticeships within organizations), exposure visits and blended learning, partnerships and knowledge networks, knowledge sharing events (such as workshops, seminars, etc.), as well as joint research and advisory services.

Such interventions, by their nature, aim to initiate or facilitate change processes. While interventions and actions can be easily related to outputs (such as the number of staff trained), the relationship with outcomes (such as organizational or sectoral performance) remains hard to quantify. Knowledge and capacity are hard to capture in simple metrics, and the way in which they develop in organizations and institutions across the sector is a complex process. Usually some impact of knowledge and development interventions may be visible in the longer term but we are still far from a reliable and verified understanding of causal and other interrelations. Moreover, knowledge and capacity development are slow processes that need to be driven by local demand and dynamics, judiciously organized and with sustained support, requiring leadership.

The 5-yearly Delft Symposia on Water Sector Capacity Development at UNESCO-IHE in Delft, The Netherlands, a tradition which started in 1991, have been thus far the only international forums dedicated to the subject. The most recent, the 5th Delft Symposium on Water Sector Capacity Development, took place on 29–31 May 2013. It provided a forum for water professionals and managers, development practitioners, policy makers, researchers and capacity development specialists. In the face of rising challenges for, and mixed experiences with, water sector capacity development, the Symposium addressed who is — or should be — taking the lead in developing capacity development across sectors, disciplines and other boundaries, so that they can be leveraged to become more effective and efficient.

This special issue of the journal *Water Policy* seeks to further the understanding of leadership in knowledge and capacity development in the water sector; nevertheless, its theoretical and methodological insights will be of interest beyond the sector. The papers in this special issue were selected from the more than 40 peer-reviewed papers that were presented and discussed at the Symposium. They exemplify our current understanding of the challenges for, experiences with, and new opportunities for knowledge and capacity development.

### 2. Summary of insights from the 2013 international Symposium

Insights from the Symposium are summarized according to eight major issues.

#### 2.1. The need to strengthen institutional and ‘absorptive’ capacity

The perception of the significance of knowledge and capacity development has not declined and is captured in statements such as ‘staff are not trained or educated properly’, ‘universities are too far from reality’, ‘ministries and other organizations are unable to use knowledge’, ‘households are not informed about the value of water’, ‘society is unaware of big decisions related to climate change’. Importantly, since the mid-1990s, it is no longer finance that is the main impediment to development, but deficient capacity. While the need for investment in and development of capacity is clear, the demand or the readiness often is constrained. This can be observed from the difficulties international financiers encounter to find meritorious and ready project proposals – both in the developing and in the industrialized world. The European Union has found it impossible to disburse all of its Cohesion Funds in the period 2007–2014 to the earmarked projects for lack of readiness and feasibility. Many
global carbon grant funds also go undisbursed for the same reason. And industrialized countries also have a tradition of over-spending on ill-chosen or ill-prepared programmes. Thus, a major leap in the strength of institutions and in their ‘absorption capacity’ is needed.

2.2. A widening of the capacity ‘gap’

Over the past decade, substantial sums in the order of US$3–5 billion (US$3–5 $ \times 10^9$) have been dedicated annually by donor agencies to knowledge and capacity development in developing countries. Clearly, over that period, most world economies have seen growing economic development. However, upon closer review this is not followed by equal growth in capacity. The World Bank Institute Knowledge Index concludes that compared to the baseline of 1995, most countries have seen no progress on their Index, or even regression (World Bank, 2010). Also, some data suggest that capacity (of all sectors) in Sub-Saharan Africa has not grown significantly since 2005 and has perhaps deteriorated (World Bank, 2006). In countries as diverse as Indonesia and the Netherlands, staff attrition, erosion of experience and weak interest from new graduates to join the water sector, are now systemic and will have effects well beyond 2020 (Kaspersma, 2013). Across the Organisation for Economic Co-operation and Development (OECD) countries, the median age of civil servants is increasing significantly (The Economist, 2009) suggesting slow attrition and loss of tacit knowledge. While much has been achieved over the past years, this does not seem to be enough; the capacity gap in the water sector (as well as others) may be actually widening.

2.3. The capacity development tool box including national strategies

The toolbox for knowledge and capacity development has expanded and has increasingly been field-tested. Four typical arenas of work are distinguished, with each calling for dedicated instruments: (1) education, research and innovation; (2) the improvement of organizations such as utilities, ministries, non-governmental organizations (NGOs) and community-based organizations (CBOs), and, to a lesser degree, private sector organizations; (3) working with communities and civil society, creating awareness and better governance; and (4) sector-wide development (concerning, e.g., sector policies, legal frameworks, etc.). Regarding the latter, sector-wide approaches and national strategies for (water-related) capacity development are being developed and implemented around the world in an increasing number of countries. The emerging experience with these is demonstrating tangible benefits and stresses the role of leadership in making them work well. This suggests that national strategies for capacity development in the water sector can help to ensure that the knowledge and skills to maintain water services and water resources are developed where they are needed, locally, and should be facilitated through a guided and inclusive multi-stakeholder national dialogue. Multi-stakeholder engagement is an important element, creating the space to include the preferences, skills and knowledge of local communities and of youth. The relationship between government and water sector organizations on the one hand and the higher education and science system on the other hand should be strengthened; this will result in more relevant education and demand-responsive research. It is also important to realize that water sector capacity cannot be built without a general improvement of capacity which, in turn, is strongly influenced by the political economy of a country. Linking such efforts to broader national development strategies is crucial.
2.4. The continuing importance of capacity development and knowledge networks

Experience built up over the last decade with information and communication technology (ICT) facilitated capacity development networks in the water sector (such as Cap-Net UNDP\textsuperscript{1}, TERI\textsuperscript{2} and many others) has indicated their relevance and effectiveness, by mobilizing and exchanging knowledge and experiences across borders. They present an expansion of formal education in water resources, aiming towards knowledge democratization, institutional strengthening and increasing social participation. Networks have been instrumental – by connecting academic institutions, water management organizations and community-based organizations – in fostering a participatory approach. They also help to avoid reinventing the wheel, instead providing room for innovation and the acceleration of implementation through adapted case studies, simultaneously developing synergy through information flows and feedback. Sharing experiences in this way and coordinating their members’ expertise contributes to developing capacity among partners from the same region, who share similar problems and needs. Multi-disciplinary networking can be instrumental to addressing nexus issues in a multi-sectoral manner, connecting water users from different sectors (e.g. water supply, agriculture, energy). Experience with knowledge networks in the Asia Pacific region shows they can have a reach that can influence public policy at a national level, with the issues addressed by these hubs ranging from national policy discussions to grass roots ‘last mile’ capacity development. Nevertheless, challenges persist; an enabling environment for networks consisting of trust, commitment and cooperation is not always easy to establish and maintain. Strategic partnerships within the water sector can help to create an environment for cooperation and trust-building. Networks also need to stay relevant by remaining flexible and adapting to change, adjusting to their members’ needs rather than enforcing or imposing structure or themes. In this regard, alumni networks and alliances can be useful to identify new initiatives and new windows of opportunity. Networking with local agencies and communities can ensure that the next generation of water education and training will fulfil local demands. Finally, by including pertinent social issues, civil society has an active role in initiating and expanding the impact of such networks.

2.5. Knowledge management practices in public sector organizations

Given their reliance on up-to-date, relevant scientific and practical knowledge and experience, as well as sound data collection routines and monitoring of the physical environment and technological infrastructure, water agencies should make a strong effort to adopt knowledge management policies and techniques. This relates to human resources management, transparent knowledge sharing in an organization, mandatory peer reviews, encouragement of networking and communities of practice, and an openness to innovation. Importantly, it also includes procedures and incentives that encourage the organization to learn from its successes … and mistakes. All activities are embedded in organizations, yet public authorities are generally not good at managing organizations. The public sector can learn much from the corporate sector, where firms such as Toyota and General Electric, but also the World Bank, credit part of their success to their knowledge management procedures.

\textsuperscript{1} International Network for Capacity Development in Sustainable Water Management.
\textsuperscript{2} Regional Water Knowledge Hub for Water and Climate Change Adaptation in South Asia.
2.6. Measuring and monitoring the impact of capacity development

Measuring the impact of capacity development interventions remains difficult but progress is being made. To assess short-term impacts, the Results Framework approach – measuring organizational performance against the original project objectives – has proven useful. However, at the same time, knowledge and capacity have distinct longer-term relevance, and capacity development by its very nature is a largely endogenous and hard-to-plan process, in which over-reliance on results in the form of net performance improvement often obscures substantial and essential capacity improvements.

Few practical methodologies are being proposed, although the OECD, United Nations Development Programme (UNDP), the Asian Development Bank and EuropAid have developed score-cards to qualify current sector-wide or macro-economic capacities. The World Bank is collecting data to calculate economic rates of return of capacity development in irrigation reform programmes. Importantly, the OECD has recently conducted research into the returns of secondary and advanced education to the nation (OECD, 2010). In this special issue, Pascual Sanz et al. (2013), Mvulirwenande et al. (2013) and Breeveld et al. (2013) report on new approaches for measuring changes in the institutional capacity in drinking water utilities. Furthermore, since monitoring and data collection are important aspects for learning from, and improving, in-progress capacity development interventions, the capacity to carry out these respective activities needs to be strengthened.

2.7. Planning and timing of knowledge and capacity development

Knowledge and capacity development takes time. It takes 5 years to plan and build a bridge but it will take 10–15 years to effectively strengthen the capacity of an organization. Yet few financiers are able to commit to such long time horizons. All capacity development implies change of old habits, which requires un-learning, understanding and developing confidence in new knowledge (explicit knowledge), incorporating this knowledge into one’s own habits, and improving on it (knowledge becomes implicit). This process needs to be judiciously planned and facilitated, and allowed sufficient time to bear fruit. Governments’ or financiers’ need for detailed monitoring and strict accounting against tangible results is often at odds with capacity development processes that are much driven by endogenous forces and take time. As a contrasting example, South Sudan is not concerned that water-related capacity development may in the short term lead to ‘brain drain’ to other (sub)sectors; instead, this is conceived as ‘brain circulation’, from which the country will experience benefits for the economy and society at large in the broader, short and long term.

2.8. The need for leadership to make change happen

In the post Rio + 20 era, ‘business as usual’ is no longer an option, and behavioural change is needed because of increasing pressures and demands on water resources. The essence of capacity development is to initiate or facilitate change processes and leadership is key for making change happen. Leadership is needed to improve cooperation and interaction between interdependent water uses such as food, energy, industry and the environment, in order to increase water security and promote sustainable development. It helps to create synergies, make more effective use of human, water and other resources, and offers career, organizational, business and partnership development opportunities by expanding the potential of individuals and teams, and transforming and improving the performance of organizations.
Importantly, leadership differs from management and is not limited to executive functions, applying to government and political parties as much as to the private sector and civil society. In essence, leadership consists of three main elements: (i) instilling a sense of purpose, creating a common vision and goal; (ii) aligning efforts and resources; and (iii) unleashing the motivation, talent and creativity of individuals and organizations. Since leadership by individuals and organizations is often lacking and, as such, is a major bottleneck, leadership development is required through a range of mechanisms, partnerships and initiatives, and on a continuous basis. Most importantly, leadership development needs to enable the build up of relevant experience to develop a visionary frame of mind, interpersonal skills and relevant tacit knowledge, all of which characterize successful (water) leaders.

3. Papers in this issue

The papers in this special issue address knowledge and capacity development in the water sector from a range of perspectives. First, they all relate to one or more distinct phase(s) of the capacity development cycle (assessment and planning, implementation, monitoring and evaluation). Second, they do so by, collectively, examining knowledge and capacity development in both the water services and water resources sub-sectors. In order to span this range and to be linked well to current, local realities, the papers rely on both academic analyses based on empirical research and practitioners’ accounts based on their professional experience. We have observed that, of the water sub-sectors, the water supply sub-sector is strongly represented in collections of papers, and irrigation not at all. This is, of course, partly because no symposium can hope to be truly representative of all sub-sectors, but we also believe that this reflects current stronger interest in the water supply utility world in organizational improvement, while the irrigation sub-sector seems to have lost some focus, after much work done in the 1990s and early 2000s on participatory irrigation management.

3.1. Setting the scene: leadership development

This special issue starts off with two papers on leadership, the main theme that runs through all of the papers. Lincklaen Arriëns & Wehn de Montalvo (2013) explore the evolution of the theoretical debate on leadership and consider how this applies to the different conceptual levels of capacity and to the water sector. Drawing on a range of individual and collective leadership case studies, the paper finds that not all key dimensions of capacity have been engaged to an equal extent in each leadership case. The authors recommend adopting modern approaches that will expand individual and collective leadership at all levels, and combine cognitive competencies, including in-depth knowledge of integrated water resources management, with transformational individual development. The next paper by McIntosh & Taylor (2013) argues that strengthening the capacity of water professionals to lead change in policy, planning, management and communities is an essential component of the collective response to global water challenges. Drawing on the concept of T-shaped professionals (which integrates insights from leadership, organizational management, learning theory, collaboration, critical thinking and praxis), the paper proposes to use this as a framework to guide the design and delivery of postgraduate education programmes aspiring to build leadership capacity in the water sector. In doing so, the authors aim to identify the types of skills and knowledge that water professionals need to stimulate and lead change and how these can be strengthened.
3.2. Capacity needs assessment

The complexity of capturing capacity notwithstanding, a situation analysis is typically the first step in, or the impetus for, any capacity development endeavour, whether locally driven and/or externally supported. The next three papers therefore focus on capacity needs assessment in a broad sense. In order to inform the efforts to meet Millennium Development Goal (MDG) 7C3, Kimwanga et al. (2013) comprehensively assess the human resource needs of organizations4 active in the drinking water supply and hygiene (WASH) sector in Tanzania and the required competences5. Based on this, they identify the range of concrete measures required to strengthen human resources in this sector and to counter the rural–urban brain drain. The paper by Mandara et al. (2013) focuses on the required capacity for decentralized rural water service provision in Tanzania. The authors argue that in the pursuit of decentralizing rural water services, at the community level, villages and households have been assigned technical and managerial roles without the parallel strengthening and provision of the necessary capacity and resources. The responsibility for capacity development, especially for strengthening capacity at the community level, is unclear; yet the results of the empirical research reveal that the sustainability of the rural water facilities (RWFs) is in fact in jeopardy and that villages far away from the district council headquarters experience numerous technical and management problems. Shifting the attention to societal capacity more broadly and from water services to water resources, the third paper in this group by Ker Rault et al. (2013) assesses the perceptions and capacity of the public to participate in integrated water resources management in several countries (Jordan, Lebanon, Syria and Turkey) in the Levant region. Using grounded theory methods (rather than social psychology) to capture perceptions, the paper finds that, contrary to top-down views, the sampled public in these countries does appear willing to participate and seems to be aware about water management challenges, both at the institutional and household level. One could argue that the focus may therefore need to shift to the competences, interests and cultures of decision makers to attain a change of mind so that they realize the value and possibilities of engaging and involving interested stakeholders.

3.3. Landscape of experience with capacity development

Next are four papers that provide insights into experiences with distinct capacity development approaches. The paper by van Dijk et al. (2013) reviews experiences with an integrated urban management Masters course in Ethiopia. The programme changed over time, adjusting the necessary skills matches and developing course specializations to allow absorption of Masters students in the government sector. Over the decade-long experience, the cooperation between local and external capacity builders evolved into a partnership with Ethiopian leadership. This seems to have contributed to the success in terms of the capacity built, the number of people trained and their contribution to dealing with water and environmental problems in an urban context. The paper by Ndirangu et al. (2013) maintains that, although improving access to water services in water-scarce Kenya is one of the country’s priorities, efforts to address the situation at the level of the enabling environment through a rigorous water sector reform have not resulted in the expected

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3 Target 7C: halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation.
4 Public sector and para-statal institutions, private sector (private consultancy companies, individual contractors, etc.), as well as NGOs and CBOs.
5 Covering the entire cycle from design and construction of new infrastructure, operation & maintenance, community mobilization, and sanitation and hygiene promotion.
improvements. Specifically, the high non-revenue water levels (currently estimated at 45%) of the Nakuru Water, Sewerage and Sanitation Company (NAWASSCO) negatively affect its financial viability. The paper analyses how inadequate capacity of the utility to deliver on its mandate was strengthened through North–South and South–South partnerships. In this case, a practical indicator of the extent to which the capacity of utility staff has improved is provided by their ability to apply the acquired expertise in supply zones beyond the pilot area.

Breeveld et al. (2013) examine an international water operator partnership (WOP) to consider the extent to which institutional experiences in the Netherlands can contribute to capacity development of the Lilongwe Water Board in Malawi. Based on an analytical approach using the Institutional Analysis and Development (IAD) framework coupled with insights from policy transfer and game theory, the paper suggests concrete means by which a WOP can serve to improve the operational processes of an operator by drawing on the institutional experiences of a partnering operator without transplanting ready-made institutional practices. The paper by Subijanto et al. (2013) is a practitioners’ account of how the Brantas River basin in Indonesia has profited by steadily developing from a project that started in 1961 into a service-based river basin organization (RBO) in 1990, following the maxim of ‘one river, one plan, one management’. The paper identifies strong leadership of the RBO as well as distinct aspects that fostered motivation (incentive schemes and an innovative corporate culture to deal with emerging challenges) as key success factors for developing and making use of existing abilities, within the RBO’s own organization as well as other sector organizations in the basin.

3.4. Monitoring and measuring capacity for sustainable success

The five papers in this last group are concerned with applying existing and developing new theoretical and methodological approaches for monitoring and measuring capacity and its development, in order for efforts and interventions to remain relevant and to generate sustainable results. At sector level, da Silva et al. (2013) argue that the WASH sector needs to be a learning and adaptive sector in order to provide sustainable services and that this, in return, relies on monitoring to provide relevant information, insights and opportunities for critical reflection. Drawing on illustrative, emerging sector-wide reviews in the WASH sector in various countries, the paper examines relevant conceptual elements and their relationships. The authors conclude that learning-oriented sector monitoring itself requires appropriate incentive mechanisms, capacities and capacity development, and that the mechanisms and tools for monitoring still need to be strengthened.

Focusing on monitoring at the level of specific capacity development interventions, Gunawardana et al. (2013) report on the implementation and evolution of the Monitoring, Evaluation and Learning Plan (MELP) of Cap-Net UNDP, an international capacity development network for Integrated Water Resources Management (IWRM). The paper discusses the lessons drawn from outcome monitoring of Cap-Net capacity development courses for 2 consecutive years, 2010–2012. These insights provide the basis for corrective measures to the on-going process of capacity development programme delivery. The authors conclude that successful monitoring relies on the interest and involvement of partner networks, and the continuous follow-up of courses, as well as on standardized monitoring processes.

The next two papers provide new theory-based approaches for monitoring of capacity development interventions, arguing that performance and capacity should constitute parallel sources of evidence. In

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6 Namely the Jasa Tirta I Public Corporation (PJTI)
the domain of WOPs, Pascual Sanz et al. (2013) contend that managing such partnerships solely by using key performance indicators on technical outputs does not necessarily inform about the progress and effectiveness of the partnership to develop capacity, thus limiting the insights for partners and stakeholders to better manage the process. The paper proposes and tests a conceptual multi-path approach to evaluate the performance of partnerships. The empirical evidence reveals substantial progress on strengthened capacity as well as insights into the process undergone by both partners. The conceptual approach therefore serves to identify emerging aspects that need to be addressed so that the partnership project remains relevant and effective. Mvulirwenande et al. (2013) use the IAD framework coupled with insights from knowledge management literature to examine not only the extent to which capacity is strengthening but also whether it is actually used. Based on empirical evidence, the paper demonstrates how the process of integrating and using competences is a necessary condition for knowledge and capacity development (KCD) interventions to result in performance improvement on technical outputs. Since this process often lags behind that of competence development, the authors suggest that KCD providers as well as beneficiaries should set realistic performance targets, taking into account that it takes time for competencies to develop at the organizational level and translate into improved performance.

Finally, Pfeiffer & Leentvaar (2013) examine the concrete function of knowledge in transboundary river basin management by drawing on the experience of an existing river commission, the International Commission for the Protection of the Rhine (ICPR), which is widely perceived as a reference for successful trust and knowledge-based collaboration. The paper tests a phenomenological approach based on actor accounts. The results suggest that active stimulation of knowledge-based collaboration can lead to substantial influence on policy processes, but that the direction of such influence is ambiguous. The authors argue that such dynamics can both support and obstruct the development of effective resource management, which has implications for capacity development aimed at effective basin management.

4. The way forward for knowledge and capacity development in the water sector and beyond

Together, the papers in this special issue and the insights from the recent Symposium summarized in this editorial introduction present an overview of the current state of the art in knowledge and capacity development in the water sector. We conclude by raising salient policy implications, and by outlining a research agenda for knowledge and capacity development in the water sector and beyond.

4.1. Policy implications

At the global level, as experience with the MDGs has demonstrated, reaching the targets for water supply and sanitation equitably within the set time span has been difficult to achieve7. It is also clear that infrastructural investments are not enough to meet these targets in a sustained manner. As Kimwanga et al. (2013) in

7 While at the aggregate, global level, the target to halve by 2015 the proportion of the population without sustainable access to safe drinking water has been met, there are substantial regional, national and rural/urban differences in the distribution of access. According to the MDGs Report 2013, ‘768 million people still drew water from an unimproved source in 2011. Eighty-three per cent of the population without access to an improved drinking water source (636 million) live in rural areas’ (United Nations, 2013: 47). For sanitation, current progress is behind target and ‘meeting the MDG target will mean extending sanitation services to an average of 660,000 people a day, every day, between 2011 and 2015’ (United Nations, 2013: 48).
this issue have indicated for Tanzania, the human resource base in many developing countries is thin or entirely missing, which, in turn, has large implications for institutional capacity. Yet the current discussions on the Post-2015 Development Framework and recent efforts to formulate sustainable development goals (SDGs) to succeed the MDGs do not yet sufficiently reflect, if at all, the importance of knowledge and capacity development, the constraints faced when trying to strengthen these and the time span involved before ‘returns on investment’ in knowledge and capacity development can be felt and reaped. As the SDGs are being devised, close attention needs to be paid to the knowledge and capacity dimension for reaching such goals in a sustained manner. Much stronger efforts are required to find smart ways of improving the knowledge base in order to make progress with the often ambitious goals and targets that are being set. As countries embark upon translating the SDGs into national policy agendas from 2015 onwards, they need to bear in mind the knowledge and capacity development efforts that will be required to meet specific SDGs and targets. Clear leadership for implementing such efforts will be essential.

At national level, policy makers need to set priorities carefully given the constraints in terms of human resources and institutional capacity across the board facing most water-related organizations (ministries, water operators, RBOs, water councils, etc.) in developing countries. ‘Water champions’ may need to reduce ambitious visions to a more realistic scope and accept that water-related knowledge and capacity development efforts may need to identify priorities, initially focusing on a specific sub-sector where the largest gains are likely to be made, whether it be the provision of water services, the management of water resources or the success of related issues, such as energy (e.g. hydropower) and food (irrigation). Such efforts should be embedded in, and guided by, the broader national development agenda.

The ICT revolution continues to spread globally with profound changes throughout industrialized and developing countries, affecting and transforming all aspects of the economy and society. The discussion about knowledge societies (Mansell & Wehn, 1998; World Bank, 1999) has helped to put knowledge development on the policy agenda but the challenge for decision makers remains, having to consider the potential and likely future impacts of ICT. For the labour aspects of the water sector, decision makers need to consider changes to and the automatization of water-related tasks, and the implications these have for the skills and knowledge base for water-related services: will they be replaced or will such jobs be increasingly ICT-heavy, requiring staff who are ICT-savvy on top of water-specific knowledge and competencies? (See also the discussion on T-shaped water professionals by McIntosh & Taylor (2013) in this issue.)

Similarly, ICTs are continuing to transform the way in which knowledge and capacity are being strengthened, for example, by using blended learning methodologies (i.e. the combination of online or electronically facilitated with offline learning). The importance of experience and tacit knowledge are likely to influence and possibly limit the extent to which learning processes can be transplanted into online environments. Nevertheless, these trends imply changes and challenges for local education systems and capacity builders alike. Finally, a range of ICTs such as affordable, innovative sensor technologies, smartphones and social media provide the means for instant data collection, sharing and broadcasting. The diffusion of these technologies is accompanied by the post-positivist view of science that now pertains, which has given rise to the realization that there is a broader range of valid and relevant information than that observed, selected and generated by scientists alone. Together, these trends pave the way for citizen observatories whereby the observations of ordinary citizens – and not just those of scientists – are included in earth observation, environmental conservation and management as well as in development efforts. By drawing on the collective intelligence and knowledge of citizens, these trends have the potential to improve water services (e.g. reporting infrastructure failures) and the management of water resources (e.g. reporting on water levels) in industrialized and developing countries alike. They also imply changes for water governance processes and may fundamentally
change existing institutional structures (Wehn de Montalvo et al., 2013a). These trends are accompanied by a move towards open data by many governments as well as donor organizations (e.g. the World Bank’s Open Data Policy was launched in 2010). In their efforts to deal with water services and water resources more efficiently and more effectively in the face of human resource shortages, policy makers and water leaders in developing countries should take the developments within the digital age into account and consider how they can help them to achieve locally-defined water governance goals and objectives.

4.2. Research agenda for knowledge and capacity development in the water sector

Several current policy discussions pose the need to justify investments in capacity development, requesting either to demonstrate returns on investment or to articulate the opportunity costs of not strengthening the knowledge and capacity base. For example, the United Nations Open Working Group which is currently preparing a proposal for the SDGs and due to report by September 2014, has made a clear request to ‘make the business case’ for capacity development in the current SDG discussions (Wehn de Montalvo et al., 2013b). Moreover, while development policy now typically focuses on knowledge for development, and especially local knowledge, recent shifts include the move from ‘aid for development’ towards ‘aid for trade’. This shows that in international development cooperation, the rationale for investing in capacity development for the sustained achievement of results is undergoing considerable change. Linear approaches that aim to specify (ex ante and ex post) the outputs, outcomes and impacts of capacity development interventions have demonstrated clear limitations. Providing the socio–economic rationale for capacity development and adjusting it to current policy dynamics therefore remains a salient topic for policy-relevant research.

Policy analysis of existing sector policies for capacity development — for the water sector and beyond — can provide important insights for countries just embarking on such efforts. Relevant research questions concern how stakeholders have worked together on such KCD sector policies, who has benefited and how, and what specific policy instruments were used and with what results. Pfeiffer & Leentvaar (2013), in this special issue, draw on some of the relevant theoretical constructs that could be applied. In a similar vein, research into the link between water-related capacity development, broader development policies and the drive towards knowledge societies needs to examine the extent to which water sector KCD policies are thoroughly embedded in larger development policies and what can be learned from such experiences.

Furthermore, there is a need to develop a sound theoretical basis and reliable methods to understand how knowledge and capacity development can be fostered in the face of complexity and unpredictability, and how the different levels of capacity (individual, organizational, enabling environment) interact and influence progress during capacity development efforts. As the papers by Pascual Sanz et al. (2013) and Mvulirwenande et al. (2013) in this special issue show, more comprehensive approaches yield in-depth results on capacity and changes in capacity. They can provide salient insights for monitoring and evaluation, providing the potential to adjust capacity development interventions while they are in progress. Now, such methods need to be developed further in order to make them more practical and applicable as part of the typical capacity development cycle.

The efforts to analyse knowledge and capacity development processes, whether in the water sector or in other domains, need to be strengthened by embedding in other, already well-established disciplines in the social sciences, such as communication science, political science, social psychology, economics and innovation studies. Doing so will enable more thorough and reliable analyses (as exemplified by several papers in this special issue) and stop the sector from reinventing the wheel, allowing it to leap ahead by improving
the efficiency and effectiveness of water-related knowledge and capacity development. Similarly, these disciplines will benefit from the analysis of familiar phenomena in different fields of application. Moreover, linking to research on learning in private sector organizations, such as the seminal work by Bell (e.g. Bell, 1984) on dynamic learning and technological capabilities, and translating this to water sector organizations (most of which do not operate in competitive environments), will provide important insights for managing these organizations and their knowledge. Also salient in this respect are innovation studies and the concept of national and sectoral innovation systems. Innovation systems consist of education institutions, universities, research organizations, industrial and private enterprises, government policies and institutions, as well as the formal and informal networks among these actors (Lundvall, 1992). In specific national and/or sectoral contexts, these elements and the interactions between them result in distinct dynamics of learning, competence building and improvements in the knowledge infrastructure. The scope of innovation systems research has recently been extended to tackling questions of development and applying the innovation system concept to developing countries (Lundvall et al., 2009). These concepts are increasingly permeating into the policy domain, with research based on the theoretical insights from this field informing policy choices. Delineating water sector innovation systems will generate insights into the dynamics of knowledge and capacity development in the water sector, taking a sectoral and actor-relations-oriented approach, identifying how formal and informal learning and competence building can be enhanced. Such research is expected to provide concrete recommendations for developing effective policies to foster water-related knowledge and capacity development and for strengthening current and future water leaders.

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