



Stakeholder engagement in water governance as social learning: lessons from practice

Uta Wehn, Kevin Collins, Kim Anema, Laura Basco-Carrera & Alix Lerebours

To cite this article: Uta Wehn, Kevin Collins, Kim Anema, Laura Basco-Carrera & Alix Lerebours (2018) Stakeholder engagement in water governance as social learning: lessons from practice, *Water International*, 43:1, 34-59, DOI: [10.1080/02508060.2018.1403083](https://doi.org/10.1080/02508060.2018.1403083)

To link to this article: <https://doi.org/10.1080/02508060.2018.1403083>



© 2017 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 24 Nov 2017.



Submit your article to this journal [↗](#)



Article views: 5238



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 5 View citing articles [↗](#)

Stakeholder engagement in water governance as social learning: lessons from practice

Uta Wehn^a, Kevin Collins^b, Kim Anema^{a,c}, Laura Basco-Carrera^d and Alix Lerebours^d

^aIntegrated Water Systems and Governance Department, IHE Delft, Delft, The Netherlands; ^bApplied Systems Thinking in Practice, School of Engineering & Innovation, The Open University, Milton Keynes, UK; ^cDe Nieuwe Vrijwilliger, Nijmegen, The Netherlands; ^dWater Youth Network, Delft, The Netherlands

ABSTRACT

The OECD Principles on Water Governance set out various requirements for stakeholder engagement. Coupled with conceptualizations of social learning, this article asks how we define and enact stakeholder engagement and explores the actual practice of engagement of stakeholders in three fields of water governance. The results suggest that a key consideration is the purpose of the stakeholder engagement, requiring consideration of its ethics, process, roles and expected outcomes. While facilitators cannot be held accountable if stakeholder engagement ‘fails’ in terms of social learning, they are responsible for ensuring that the enabling conditions for social learning are met.

ARTICLE HISTORY

Received 28 March 2017
Accepted 7 November 2017

KEYWORDS

OECD Principles on Water Governance; stakeholder engagement; social learning; e-participation

Introduction

A core principle of the Water Governance Principles formulated by the Organisation for Economic Co-operation and Development (OECD) in 2015 recognizes the importance of promoting stakeholder engagement in water governance processes (OECD, 2015). Stakeholder engagement has become a central requirement for water-related projects in many different contexts, amid demands for long-term benefits such as sustainability and resilience as well as developing fragile but powerful intangible assets such as trust, ownership and acceptability (Von Korff, Daniell, Moellenkamp, Bots, & Bijlsma, 2012).

While international and regional treaties such as the Aarhus Convention or the Dublin Principles for Integrated Water Resources Management require citizen participation and the establishment of mechanisms for public participation in decision making, the importance given to these institutional imperatives, their interpretation and the extent of their implementation varies. Several studies have also shown that many participatory approaches fail to lead to more informed and effective policy and practice (Behagel & Turnhout, 2011; Edelenbos & Klijn, 2006; GWP, 2000), whether from insufficient or misused resources, organizational intransigency or poor design for those processes to deliver their full potential. Also, groups such as young people and local community members are often overlooked due to power differentials and

organizational ‘expectations’. Thus participation is often poorly defined, too often considered a ‘formality’ or an adjustment variable within the budget of scoping studies (like environmental and social impact assessments), such that an obligation to participate is rarely taken as an opportunity to improve projects and generate collective learning (Barreteau, Bots, & Daniell, 2010; Irvin & Stansbury, 2004; Rinaudo & Garin, 2005).

Despite these concerns, stakeholder engagement, as a subset of broader participatory imperatives, is often a requirement for policy makers, authorities or utilities to engage with citizens or members of the public who have a stake in the decision or outcome, but may not normally be considered part of the core decision-making process. However, this interpretation can overlook the equally important role of decision makers and practitioners as stakeholders and the possibility of their engagement with each other, leading to learning and improvements and increased likelihood of situation improvement.

Despite the claimed value that sound stakeholder engagement can provide to water projects (OECD, 2015), the business case remains hard to defend for promoters of dialogue, when costs are immediately measurable but benefits could take time to arise, remain opaque and be unequally distributed among stakeholders. In a recent OECD survey of 215 water stakeholders, only 8% perceived market opportunities as a driver for stakeholder engagement, compared to regulatory or emergency-related drivers, suggesting that stakeholder engagement, while important as a regulatory requirement, is a low business priority in terms of economic development and business growth. In warning of a ‘ticking the box’ approach to stakeholder engagement, the survey reveals that stakeholders mostly interact within their immediate sphere of activity, that engagement processes are rarely evaluated, and that there is no simple way to measure their impact (OECD, 2015). Thus, stakeholder engagement varies in conceptualization, drivers, ‘fit’ with organizational cultures and goals, and practice, with commensurate variation in outcomes and interpretations of viability and usefulness. How then should we conceptualize and enact stakeholder engagement?

To improve understanding of Principle 10 of the Principles on Water Governance, ‘Promote stakeholder engagement for informed and outcome-oriented contributions to water policy design and implementation’ (OECD, 2015), this article aims to contribute to theoretical and empirical debates on what stakeholder engagement means and may deliver in practice in the context of water governance. Specifically, we argue that stakeholder engagement entails not only public participation but multi-stakeholder interaction, dialogue and learning and that it requires more than a top-down decision-making process to make it succeed. Drawing on conceptualizations of social learning as well as participation in decision making, this article reflects on different modalities for the engagement of distinct stakeholders in three fields of water governance: the use of citizen observatories of water to engage citizens in flood-risk management in the UK, the Netherlands and Italy; the involvement of policy makers and practitioner members in the catchment-based approach as part of implementing the Water Framework Directive in England; and the role of under-represented groups, i.e. young people, the homeless and local communities, in water security at different levels—regional (in Europe), district (in France), and community (in Kenya). The empirical evidence is subjected to within- and across-case analyses to generate in-depth

understanding of the dynamics of different stakeholder engagement processes in these respective fields of water governance.

The article is structured as follows. The second section defines the theoretical context of our research, followed by the presentation of methodological details in the third section. The results of the empirical research per case study are analyzed in the fourth section. Using the conceptual framing of stakeholder engagement as social learning, the fifth section discusses the findings and lessons from practice, and the sixth proposes concrete recommendations. The seventh section offers conclusions.

Theoretical context

Stakeholder engagement in decision making

Participation as a concept, method and practice has been discussed extensively in the literature since Arnstein's (1969) ladder offered a simple structure for identifying power-based degrees of citizen involvement in decision making (Bruns, 2003; Collins & Ison, 2009; Fung, 2006; Hurlbert & Gupta, 2015; Ison, Röling, & Watson, 2007; Mostert et al., 2007; Reed, 2008; Voinov et al., 2016). We do not rehearse these debates here, other than to note that they highlight the importance of clarity on meanings and concepts. There are distinctly different forms of participation, with varying outcomes and impacts (Fung, 2006; Reed, 2008) that depend on the contextual setting and the nature of the issue or problem at hand (Hurlbert & Gupta, 2015). This article follows Rowe and Frewer (2004, p. 253) in recognizing participation, in broad terms, as 'the practice of involving members of the public in the agenda setting, decision-making, and policy-forming activities of organizations/institutions responsible for policy development'. They go on to distinguish public *consultation* as characterized by an active process of information exchange and dialogue between those involved. They suggest public *engagement* as a collective term encompassing public communication, public involvement and public participation (p. 254) – the distinctions of each being dependent on the dynamics of information flow between the sponsor of the process and the participants and on the effectiveness of the mechanisms deployed commensurate with these distinctions. Thus, engagement is a wide-ranging, but active, dynamic process where stakeholders are 'allowed in' to participate in decision-making processes.

The OECD (2015, p. 32) defines engagement as a broad umbrella term and stakeholder engagement as the opportunity for those with an interest, or 'stake', to take part in decision-making and implementation processes. Here, stakeholders are distinct from simply the wider 'public' and can also include government actors, the private sector, regulators and NGOs.

A stakeholder is usually defined as someone having an interest in a particular situation, even if this interest is not recognized or acknowledged by others. Nevertheless, awareness of the dynamics of engagement leads some authors (Collins, Blackmore, Morris, & Watson, 2007; SLIM, 2004a) to suggest that *stakeholding* may be a preferable concept because it conveys the notion that stakeholders *actively* construct, promote and defend their stake over time and can sometimes defend their stake and exert influence by *not* engaging in participatory processes. A focus on *stakeholding* as a

process rather than *stakeholder* as a noun allows insights into how stakes are constructed, reshaped and ‘shared’ in social learning processes (see below).

Stakeholder engagement is seen as a means of contributing to improved water governance, where governance is defined as the policy and practices giving rise to particular forms of water managing in different contexts. It is defined as a critical principle for sustainable development and building a resilient society (Gunderson, 2003) and is both a means and an end, insofar as it can lead to increased stakeholder empowerment and make planning and decision-making processes more transparent and democratic (Hare, Letcher, & Jakeman, 2003). It is also claimed to enhance the capacity of individuals to improve their own lives, facilitating social change (Clever, 1999). Local knowledge and expertise can be valuable for understanding local situations and contexts, planning objectives and policy measures, as well as improving and/or creating innovative and alternative strategies; as a result, the sustainability of the adopted policy strategy will generally be higher (Hurlbert & Gupta, 2015). Stakeholder engagement can also promote social learning, as stakeholders *acquire* (rather than just convey) knowledge and collective skills through better understanding of their situation as well as the perceptions, concerns and interests of other stakeholders (Basco-Carrera, Warren, Van Beek, Jonoski, & Giardino, 2017; Collins & Ison, 2009; Evers et al., 2012; Hare, 2011; Voinov & Bousquet, 2010). Finally, stakeholder engagement can foster consensus among competing organizations by opening channels of communication, generating mutual understanding, and negotiating alternative solutions (Loucks, Van Beek, Stedinger, Dijkman, & Villars, 2005; Sadoff & Grey, 2005; Hare, 2011; Zeitoun & Mirumachi, 2008).

In this vein, the OECD principle of stakeholder engagement is aimed at enabling informed and outcome-oriented contributions to water policy design and implementation (Akhmouch and Clavreul, 2016). The OECD sets out various requirements for stakeholder engagement, which in summary are: recognizing the range of actors with a stake in a situation and understanding their possibly diverse responsibilities; paying special attention to underrepresented groups; identifying the process of decision making and stakeholder inputs; encouraging capacity development of stakeholders; assessing and evaluating engagement processes; promoting conducive institutions; and contextualizing stakeholder engagement initiatives.

However, the actual dynamics in the engagement process mean that these positive outcomes are far from automatic or guaranteed, as increasing evidence shows (Behagel & Turnhout, 2011; Edelenbos & Klijn, 2006; Furber, Medema, Adamowski, Clamen, & Vijay, 2016). Stakeholder involvement implies – explicitly or implicitly – trade-offs in terms of representativeness, inclusion, or (in)equality in interactive processes (e.g., Sørensen, 2002; Mayer, van Bueren, & Bots, 2005; Sørensen & Torfing, 2007), i.e. between the ‘breadth’ and ‘depth’ of involvement (Voinov et al., 2016). For example, in terms of the breadth of stakeholders involved or procedural fairness (Adger, Paavola, Huq, & Mace, 2006), under-represented groups such as young people, local communities and the homeless are not frequently acknowledged as ‘well-placed’ stakeholder groups, e.g. to address the challenges related to water security. Their relatively limited experience, knowledge or vulnerability make it difficult for them to be considered as key stakeholder groups, and therefore to participate actively in decision-making processes. Substantive aspects also come into play (Van Buuren, Driessen, Teisman, & Van

Rijswick, 2014) concerning the extent to which all stakeholder inputs and interest have actually been taken into account. In water management and spatial development, policy making and decision making have tended to be expert-driven and expert-produced according to technocratic standards (DeSario & Langton, 1987; Fischer, 2000; Hisschemöller, 1993). This includes the belief that the desirability of the solution can be shown by standardized methods and technical procedures and that the use of available expert knowledge is sufficient for an efficient implementation of the solution. Consequently, the participation of stakeholders is often considered superfluous, because they do not have the (technical) knowledge and expertise required for situation appraisal or resolution (Edelenbos, Van Schie, & Gerrits, 2008). Moreover, the dynamic of stakeholder engagement is changing and increasingly subject to intermediation via digital innovations (Voinov et al., 2016; Wehn & Evers, 2015). Evidence of how to capture these emerging opportunities as well as how to address the accompanying challenges is limited, not least due to a lag in updating stakeholder conceptualizations for the digital age (Wehn & Evers, 2015). Nevertheless, while important, the mechanism of stakeholder engagement is secondary to the underlying purpose. In this sense, emphasis is moving away from procedural nicety to a fundamental concern with making sense of complex situations, where stakeholder engagement is seen as a form of social learning.

Social learning

Social learning has become an increasingly frequent term in the literature on participation and stakeholder engagement processes, but its interpretation, use and endorsement vary (Blackmore, Ison, & Jiggins, 2007). Initially coined by Bandura (1977) to describe *individual* learning in a social context, the concept of social learning has since been expanded to include learning emerging from *collectives* or groups (Ison et al., 2007; SLIM, 2004b). There are many authors exploring the concept of social learning in environmental policy and water governance contexts (Colvin et al., 2014; Ison et al., 2007; Pahl-Wostl & Hare, 2004; Pahl-Wostl et al., 2008; Röling, 2002; Scholz, Dewulf, & Pahl-Wostl, 2014; Woodhill & Röling, 1998). Some of these authors are exploring environmental problems based on a more integrative approach and systemic understanding using systems approaches. These aim to engage with the inherent complexity of water governance and how change in the ‘right’ direction can be fostered via social learning, i.e. fostering the capacity to becoming adaptive systems (see e.g. Ison, Collins, & Wallis, 2015). We do not rehearse these complex debates and differences here, but note that the common element in this discourse is the realization that complex environmental situations require, among other factors, collective learning and common understanding.

One of the most salient aspects of social learning related to stakeholder engagement is therefore the collective – rather than individual – process of learning, knowledge co-creation and accumulation of wide experiences to generate a broader knowledge and evidence base from which decisions can be taken. Specifically, we consider social learning an emerging governance mechanism to promote concerted action among stakeholders to improve water governance (Collins et al., 2007; Ison et al., 2007). Concerted action is framed not as a replacement, but as complementary or enhancing

to existing mechanisms, e.g. regulations, fiscal measures and education, through for example information provision (SLIM, 2004b).

In this sense, social learning can be understood and summarized as one or more of the following (after Collins & Ison, 2009):

- The convergence of goals (expressed as purpose)
- The process of co-creation of knowledge which provides insights into the causes of a situation and the means of its possible transformation
- The changes in behaviours and actions resulting from new understandings
- An emergent property of the process to transform a situation.

The implications of this interpretation of social learning are that stakeholder engagement is conceived as purposeful and designed to enhance cooperation and learning between stakeholders. This enables understanding of the water governance situation and how it can be progressed and transformed, including changes in mental models, beliefs, perceptions, and – as a result – practices. Increasingly, attention also turns to processes of social learning mediated by online environments (Joshi and Wehn, 2017; Voinov et al., 2016; Wehn & Evers, 2015), which are subject to change and evolution triggered by differing ways in which data and information can be shared and knowledge co-created. Online portals (Bourget, 2011; Cockerill, Tidwell, Passell, & Malczynsky, 2007; Evers et al., 2012; Jonoski & Evers, 2013) and social media (Wendling, Radisch, & Jacobzone, 2013) are gaining relevance as alternative and mainstream mechanisms for e-participation.

With new forms and increased opportunities for engaging stakeholders, we investigate stakeholder engagement as social learning in specific cases in order to inform and guide the implementation of the OECD principle of stakeholder engagement. Specifically, we aim to guide the assessment of the process and outcomes of stakeholder engagement in terms of social learning, focusing on stakeholder dynamics, knowledge co-creation, and individual behavioural changes as well as collective transformation.

Methodology

Research design and selected case studies

The research reported here was not designed or undertaken as part of a single project or initiative, and not intended specifically to illuminate the OECD principles. Instead, the authors have collaborated post-research to explore insights and findings which may bear on understanding and furthering stakeholder engagement as social learning in water governance. The designs of the case studies, their focus and their contexts thus vary considerably, as shown in Table 1.

While the diversity of design is evident, the focus on social learning is a common theme, albeit not necessarily understood in advance in each project with reference to the framing of social learning noted above. The analysis therefore proceeds first with reporting the main findings in the context of each case study and then, second, on an ex post basis to develop a retrospective meta-analysis of the findings emerging across the case studies and the extent to which these findings have bearing on the OECD principle.

Table 1. Overview of empirical research for the case studies.

	Catchment-based approach for the Water Framework Directive	Water Youth Network water projects	WeSenseIt citizen observatories
Geographic focus of the case	UK	Europe (consultation during Stockholm World Water Week), France (Paris), Kenya (Tigithi community, Laikipia District)	Doncaster, UK; Delfland, Netherlands; Alto Adriatico, Italy
Scope	National	Regional, district, community	City, region, catchment
Data collection instruments	Workshops and interviews	Focus group discussions, questionnaires and interviews	Interviews and focus group discussions
Timing of empirical research	2013–16	2015–2016	2012–2016
Type of respondents/ interviewees	Policy makers from government and NGO communities; practitioners; researchers	Under-represented and vulnerable groups (young people, homeless and community members)	Authority representatives (policy and decision makers), trained volunteers, general public in Doncaster, Vicenza and Delfland
No. of respondents/ interviewees	Two workshops of about 15 participants each, plus five interviewees in 2015	245 respondents over the course of 2 years: 91 persons consulted in small focus discussions, 20 interviewees, and 134 questionnaire respondents	83 interviewees over the course of three years

Data collection

As would be expected in diverse projects with diverse aims, scales and stakeholders, the processes of data collection varied across the case studies. The generated evidence is anecdotal, but within an action research context and process, and provides a rich basis for our inquiry into the process and outcomes of stakeholder engagement in terms of social learning. A summary of the data collection processes is shown in Table 1. In our view, rather than being a weakness, the diversity offers the opportunity to explore the role of social learning in stakeholder engagement in a range of contexts and situations and thus whether the OECD principle has relevance.

The main element of the UK case study reported here focusses on water governance in relation to implementation of the Water Framework Directive in England. In the light of ongoing concerns that current institutional arrangements are insufficient to deliver improvements in water quality (Watson, 2014), in 2012 the Department for Environment, Food and Rural Affairs (DEFRA) initiated a Catchment-Based Approach (CaBA) to fill a policy and practice ‘gap’ between the regional river basin (consisting of several catchments) and the individual water body focus of the Water Framework Directive – an arrangement which hitherto had largely ignored individual catchments. With policy leadership and seed funding from DEFRA and support from the Environment Agency of England and Wales, CaBA has developed into a network of over 100 catchments in England and Wales adopting a community-based approach to improve water environments. Over the last four years, a team of researchers at the Open University in the UK has been undertaking action research work with the national CaBA National Steering Group (NSG). With the CaBA initiative now in place, what does more integrated and systemic water governance look like? It was with this question that the Open University researchers, as part of the CADWAGO

project, engaged the policy makers and practitioner members of the CaBA steering group and associated stakeholders. The research reported here centres on a systemic co-inquiry with stakeholders to improve understanding and practices in relation to water governance.

Informed by traditions in systems theory, methods and approaches, systemic co-inquiry is a mode of investigation that is open and flexible as to the nature of the situation of concern, the direction of the inquiry and the different epistemologies and methodological traditions of the stakeholders involved (Ison, 2010). At the core of the co-inquiry is a commitment by the participants (including the researchers) to a social learning process, in this case using elements of soft systems methodology (SSM) (Checkland, 1981; Checkland & Scholes, 2002) and diagramming skills taught and developed at the Open University. The outcomes of a systemic co-inquiry are not predetermined but centre on stakeholders' learning and possible changes in understanding about a situation which can lead to new forms of policy and practice.

The WeSenseIt case studies were undertaken within an action research framework (Greenwood & Levin, 1998; Lewin, 1946), triggering change – in this case the participatory development of the citizen observatories over the course of four years – while at the same time studying and reflecting on the wider effects and outcomes that are being generated. The researchers thus had dual roles as project team members and social scientists studying the emerging changes and capturing changes in behaviour of the stakeholders in the local water governance processes, on the basis of interviews and focus group discussions with citizens and local authorities. These data collection efforts were undertaken according to the conceptual frameworks adopted for WeSenseIt (Wehn & Evers, 2015; Wehn, McCarty, Lanfranchi, & Tapsell, 2015; Wehn, Rusca, Evers, & Lanfranchi, 2015).

The Water Youth Network (WYN) projects were led in 2015 and 2016, under several project funding and project leaders. Each has its own evaluation and research components. An analysis was then conducted to assess the components of young people and vulnerable people's participation and mobilization. The project leaders and researchers were consulted and their inputs were consolidated by two young researchers of the WYN.

Data analysis

For the UK case, data analysis was largely undertaken by the participants themselves during the co-inquiry events as they worked through a range of tasks to develop their thinking. Post-workshop analysis was mostly in the form of writing up the results in a readable form: a workshop report. The diagrammatic elements of the workshop (e.g. systems diagrams) are not readily analyzable, beyond the role they serve in the discussion and development of ideas.

For the WeSenseIt cases, interviews and focus group discussions were transcribed and initially analyzed according to the conceptual frameworks adopted for WeSenseIt. The collected information was analyzed by attributing the focus group transcripts, texts from the interviews and observations to different predefined indicators of good governance, community resilience and participation in general. This generated a structured matrix with qualifications and quotes per indicator per case.

For the WYN cases, data analysis was done at the end of each project, based on data collected before, during and after the activities. Data were collected through key stakeholders' interviews, consultation and household surveys. A secondary data analysis was conducted in 2016. All documents from the projects, feedbacks from team leaders and project researchers were used.

The meta-analysis undertaken for this article took the form of the contributing authors identifying learnings from their respective case and then identifying emerging themes in relation to the conceptualizations of social learning used in this article. An initial tabulation served as a device for refining our collective understanding of, and discussion about, the commonalities and differences between the cases and how the lessons learned can inform the implementation of the OECD principle of stakeholder engagement.

Results and analysis

This section presents a detailed analysis of the selected cases, covering the following elements for each case to capture the dynamics of stakeholder engagement and social learning: (1) the 'who, what, where, when, how and why' of stakeholder engagement; (2) the extent of the convergence of goals during the social learning process; (3) the process of co-creation of knowledge which provides insights into the causes of a situation and the means of its possible transformation; (4) the changes in behaviours and actions resulting from new understandings; and (5) the extent to which social learning is an emergent property of the process to transform the situation. In terms of correlating these to the OECD principle of stakeholder engagement, we suggest that these elements are key to understanding the *purpose* of stakeholder engagement and thus its role as a means to improve outcome-oriented contributions to water policy design and implementation. In each of the cases noted below, we have described the diverse actors involved and explored their motivations and interactions. Capacity development has been a key design element of each and was undertaken in response to a variety of contexts. As these are mostly research-driven cases, our assessment of the cases and the contributions of stakeholder engagement is focussed on the emergent learning rather than detailed cost basis.

Catchment-based approach (UK)

Who, what, where, when, how and why?

This case focusses on the social learning arising from two events undertaken as a part of the systemic co-inquiry and reported more fully in Foster (2017). The two events in 2016, each with 15 representatives from senior policy and practitioner communities, focused on (1) the current and (2) the future water governance situation in England, respectively, and each provided a mix of participatory sessions and presentations exploring aspects of water governance and possible improvements and opportunities for concerted action.

Convergence of goals

The act of initiating the co-inquiry set in train at least a collective interest in the situation: how CaBA can contribute to managing water more effectively in England. Negotiations and exploration of possible themes with DEFRA and the chair of the CaBA NSG helped give some shape to the inquiry, but the exact focus was left open. In this sense, the inquiry did not require convergence of goals from the outset or as a precondition, other than a willingness of participants to engage in the process itself.

Process of knowledge co-creation

The first participatory activity in the first event – focussing on the current water governance situation – used a technique of rich pictures. This is a visual/diagrammatic exploration of the situation in unstructured form and is part of SSM. The resulting rich pictures (see Foster, Collins, Ison, & Blackmore, 2016) reveal agreement on the complexity and messiness of the situation, showing, for example, conflicting stakeholder interests; crises, including flooding and pollution; and the diverse and sometimes overlapping roles of institutions and organizations at different levels, from local to EU. In comparing their rich pictures, stakeholders realized they had difficulty in gaining an overall understanding of the water governance system – not least because of the problem of determining the nature of the system or its constituent boundaries.

There were some significant areas of consensus, leading to an agreed description of the current water governance system and its stakeholders in the form of a ‘root definition’ (a methodological convention in SSM). Paraphrased, the definition of the current water governance system described it as a disconnected and opaque system, managed by the EU, government and water companies, to deliver public water supply using top-down regulatory approaches in order to support economic growth and welfare (Foster et al., 2016).

In this case, the root definition revealed collective insights into the form and purpose of the current water governance system and its key limitations and thus the basis for which improvements could be discussed and identified.

Suggestions for possible improvements to existing water governance took the form of ‘what is’/‘what ought to be’ statements – each identifying a key aspect of the system and ways it could be improved. Through negotiation and discussion, the stakeholders identified a shared concern that the Water Framework Directive’s ecological objectives were being pursued at the expense of a wider range of social, environmental and economic concerns which might also lead to improvements in water quality, but, critically, as an *emergent property* of an improved water governance system rather than a predetermined target.

By the end of the first event, the stakeholders had identified a range of shared concerns about the purpose and boundary of current water governance in England, including the role of CaBA, and had also begun to explore the threads of possible improvements.

The second event then focussed on future water governance, again using SSM to structure the inquiry, beginning with a rich picture. Although retaining the complexity and messiness, the rich pictures of future water governance depicted water governance

as a more positive imperative, with different stakeholders working towards shared goals and an emphasis on social/community-led learning and action, shared ownership and responsibility, and collaboration. This shift was also very evident in the root definition of a future water governance system. This foresaw an iterative, place-based, more reflexive, learning system to optimize the management of water by engaging and empowering society to make equitable decisions and take collective/concerted actions; one which valued natural capital in order to deliver human health and well-being within the constraints of social, environmental and economic capital (Foster et al., 2016). The discussions are notable because of *the lack* of specific focus on water quality as the prime target or goal.

In SSM, root definitions convey a sense of an ideal state to offer comparison with the 'real world' in order to identify scope for improvements and actions. In this regard, determining root definitions becomes a social learning process among the stakeholders, and the root definition is both a device for, and evidence of, social learning about possible improvements to effect a transformation. Even so, it is important to note that not everyone was always entirely comfortable with the process or the outcome, particularly the limited time available for discussion and detailed analysis.

Changes in behaviour and actions resulting from new understandings

If we recognize a dynamic relationship between changes in thinking and changes in behaviour, it is important to note that although these were part of an ongoing relationship with the various stakeholders involved, the co-inquiry events described here were time-constrained and one-off processes. As such it is not possible to determine long-term changes in behaviour without a longitudinal data-set. However, for the participants, the workshop processes represented a marked change in how ideas about water governance *could* be approached, discussed, explored and different perspectives acknowledged. Remarks to the research team during and after the co-inquiries suggest that the discussions were of significance in shaping their ideas and follow-up discussions in thinking about CaBA as an innovation in water governance and its direction of travel.

An emergent property of the process to transform the situation

An emergent property arises from the interaction of various parts of a system. In this case, knowledge and insights into the boundaries and constraints of current water governance systems and the different framings of water governance might be considered an emergent property made possible by the social learning process described above. By engaging with each others' multiple perspectives, stakeholders were able to develop new perspectives and, as a result, appreciate and identify new framings and forms of water governance. Nevertheless, the extent to which this emergent property 'holds' or has longevity remains in question.

WeSenseIt citizen observatories of water

Who, what, where, when, how and why?

Between 2012 and 2016, an EU-funded FP7 project called WeSenseIt designed and implemented three citizen observatories to test, experiment and demonstrate their potential: involving citizens and not just scientists and professionals in data collection and establishing a two-way communication paradigm between citizens and authorities involved in flood-risk management. Each was fed with data by both physical sensors (e.g. water-level sensors) and social sensors (e.g. mobile applications). All three observatories focused on flood risk and were put in place in collaboration with water management and/or civil protection agencies. Citizen observatories present the potential for not only higher information density for environmental management but also for considerable improvements in, or in fact new means of, engagement. Their features can enable a two-way communication paradigm between citizens and decision makers, potentially resulting in profound changes to existing flood-risk management processes (Wehn, Rusca, et al., 2015). In collaboration with the respective water management and/or civil protection agencies, Doncaster (UK), Vicenza (Italy) and Delfland (Netherlands) were selected to implement citizen observatories focussed on flood risk. Apart from the local authorities, the observatories aimed to involve citizens, and two of the three observatories involved trained volunteers as well.

The research objective was the same in all three cases: to explore how or under what conditions the combination of new and existing sensing and monitoring technologies, together with interactive information and communication technologies (ICTs) provided in the observatories, can serve to foster e-participation in flood-risk management. Still, over the course of four years, the ways the three observatories were designed, implemented and used evolved in three very different ways. In the Doncaster case, the authorities decided to give the community ownership of the observatory. The online platform got a peer-to-peer focus and was used by the authorities only to monitor the situation on the ground. In the Vicenza case, the authorities took the opposite stand and kept full responsibility for what was posted, when and by whom. This online platform became a tool for coordination and communication between trained volunteers and emergency services. Here the platform was so successful that it was implemented not only in the case study area but at a regional level, with the embedding of the concept of citizen observatories into the regional policy as a means for environmental resources management. Finally, in the Delfland case, the decision was made to build on existing communication structures to ensure responsiveness. The online platform in this case saw little activity.

The convergence of goals

During the set-up of the observatories in both Vicenza and Doncaster, the respective objectives of the authorities and citizens increasingly converged. In Vicenza, existing trained volunteer groups were aiming to enhance their mutual collaboration, where the Civil Protection Agency was mainly interested in more and better ‘eyes and ears on the ground’. The observatory platform launched under WeSenseIt redefined

working relations (and methods) while also generating more detailed situational awareness.

In Doncaster, the objectives at the start of the project were formulated quite abstractly, and the implementation of the platform was not really successful until the council staff interacted with the engaged flood wardens face to face and demonstrated their understanding of concrete issues on the local and household level. The moment the flood wardens were able to ‘put a name to a face’ and felt understood, they were also more ready to help out and upload information about their local situation. In both cases, the convergence was triggered by the need or wish of the authorities to get (inter) action on the platform. The citizens and volunteers were accommodated in their objectives and drivers in order to get them to participate.

In Delfland, the citizens targeted for participation were not uniform or organized enough for the water board to converge to their goals, and the observatory in Delfland struggled for participating audiences throughout the project.

The process of knowledge co-creation

One of the first and most valued outcomes in all three cases was the levelled access to relevant and specific information between stakeholders. Authorities can now make use of the eyes and ears of citizens, while citizens and other stakeholders have gained insight into the data that decisions are based on (pumping regimes, road closures, etc.). This emancipates the dialogue and enhances the effectiveness of participation.

One specific example of co-created knowledge comes from the Doncaster case, where at one location the local residents argued that, with previous flood events, one specific field had always been inundated first. The prevailing flood model for that location did not support that observation, but one of the physical sensors related to the platform was placed in the middle of the field. The historic observations of local residents were correct, and the flood model was proved wrong. Using this knowledge hydrologists discovered a slight tidal influence on the behaviour of the river – and with that a few of the candidate flood-prevention measures were proven irrelevant.

An important side effect of this process of co-creation between authorities and citizens was the mutual respect and understanding that slowly grew when they were working together towards the same objectives.

Changes in behaviours and actions resulting from new understandings

The observatories facilitated dialogue between stakeholders, but could not force this dialogue into existence. For all involved parties, feedback on their efforts was needed for them to stay engaged and keep sharing. The success and use of the observatories therefore depended on whether and how the involved authorities wanted to cooperate with citizens and other stakeholders. This is not an easy decision, since this cooperation comes with responsibilities, in terms of both continuity and responsiveness (Wehn, McCarty, et al., 2015).

In all three cases, the authorities appeared hesitant to transfer their interactions with citizens into the online environment of the observatory, owing to fears of interrupting established procedures and the perceived objective of having to respond to citizens’

online activities. Liability and accountability concerns are particularly salient in the preparation, impact and response phases of flood-risk management (e.g. having to respond quickly to online posts about flooding, creating an additional channel for the emergency response team, separate from their existing decision support systems). Different choices in that respect were made in the three case studies, leading to the above-mentioned very different outcomes of the observatories.

The closer connection between authority representatives and flood wardens in Doncaster led to less-formal contact; council staff would occasionally attend social events in the neighbourhood, and community members said they were less hesitant to pick up the phone and report or ask something.

In Vicenza, professionals stated that their esteem for the volunteers was already high and had not changed much in that respect. Still, even there, the Civil Protection Agency did keep its hierarchical status but also adopted a more central role between the different volunteer groups.

An emergent property of the process to transform the situation

The results of the observatories' respective flood-risk management strategies focused on sharing information and building community trust; competences in the community and effective response; or efficient and effective risk mitigation. Each of these three outcomes was valued in its own local context by local stakeholders. This shows that citizen observatories are tools or frameworks that can help generate or support an array of participation approaches, depending on how they are put to use.

The three WeSenseIt cases demonstrated how acutely aware authority representatives already are of the responsibilities that go hand in hand with engaging with their citizens. The belief that citizen engagement should be done only if 'you're in it for the long run' is widely shared among the authorities involved in these observatories. The self-imposed standards for responsiveness are very high – almost paralyzing. Trust, ownership, continuity and responsiveness are indeed important issues to take into account. And given different traditions, cultures and backgrounds, these issues would need to be resolved differently in each case.

In each context of the WeSenseIt case studies, tailor-made approaches were chosen, leaving room for citizens and authorities to find their own form of collaboration and mutual trust. In all three cases, the project ended with a mutual understanding of the topic. Furthermore, there is clear evidence that shared understanding and better collaboration can lead to more trust between the parties involved.

The Water Youth Network case

Who, what, where, when, how and why?

In 2015 and 2016, the WYN led a set of consultations and operational and research projects in collaboration with other young people and youth-led organizations to support shaping the 2030 Agenda for Sustainable Development and enhance their participation in the co-creation of knowledge in the water sector regarding securing water for all.

In Sweden, during the Stockholm World Water Week of 2015, a session was organized by two youth organizations: WYN and the World Youth Parliament for Water. As part of the session, a consultation was held to define the role of young people regarding the OECD water governance principles, with special focus on stakeholder engagement (i.e. young people and under-represented groups), and how these principles could be used for youth-led operational water projects. A total of 91 respondents from all over the globe participated in the consultation: 15% were underage people (15–18 years old), 26% were young water students (18–25), 38% were young professionals (25–35) and 21% were senior professionals (over 35).

Multi-stakeholder engagement and partnerships are considered critical elements in the achievement of the Sustainable Development Goals (SDGs). In 2016, the Youth in Action for Sustainable Development Goals (YiA4SDG) project under the ERASMUS+ umbrella aimed to promote the SDGs via a global youth-led call for action and to support practical solutions via awareness-raising, capacity development, co-creation of knowledge, and project piloting and evaluation. A total of 17 pilot initiatives in various countries in Europe, each promoting and helping in the implementation of the SDGs, were supported under the umbrella of the YiA4SDG project.

In line with the OECD water governance principle of stakeholder participation, the Sendai Framework for Disaster Risk Reduction calls for the participation of relevant stakeholders in strengthening disaster-risk governance to manage disaster risk. National and international meteorological agencies predicted a weak El Niño in early 2014. However, by the end of 2014 and early 2015, there was agreement across most agencies that there would be a strong El Niño effect in various regions across the globe, alerting communities and governments to prepare for the worst: excessive rains, drought, flooding and other weather-related disasters. With the research study Local-Level Preparedness and Response to the El Niño Phenomenon Early Warning in Tigithi, Kenya in 2016, the WYN aimed to demonstrate the role that young researchers can have in managing disaster risk by collecting scientifically relevant information to understand local-level preparedness and response to the El Niño–influenced weather in Kenya, as well as empowering local communities as a means towards building a resilient society. A team of seven young researchers (one international and six local) with expertise in disaster-risk reduction analyzed the relevance and usefulness of the forecast advisories and preparedness and response plan for the El Niño phenomenon for the agro-pastoral communities in Laikipia County and their day-to-day challenges. The evaluation methods were surveys and face-to-face interviews with local community members. A total of 134 people were interviewed: 85% adults (over 35 years old; 46 male and 67 female) and 15% young people (7 male and 14 female). Only 40% had basic education; 63% were engaged in farming as their main occupation.

Convergence of goals (expressed as purpose)

The complexity associated with the political and institutional contexts due to differences in ambitions, values and interests between agencies and institutions, different understandings of the problems at stake, or restricted resources often restricts the involvement of under-represented groups. The participation of young people and local communities in decision-making processes and global agendas is therefore

frequently considered an added risk rather than an added value. Highlighting their vulnerability and limited experience or knowledge, among other factors, is a commonly used mechanism for restricting their engagement. The WYN aims to shift this paradigm by facilitating the participation of under-represented groups, mainly young people, via a structured engagement process that can accommodate the complexity of the particular context and provides room for the co-creation of knowledge. This framework based on social learning helps reduce risks by allowing under-represented groups to better understand the complexity and functioning of a particular governance and decision-making context. It also facilitates the constructive contribution of these groups by means of local knowledge, new developments and innovative ideas.

The process of knowledge co-creation

The three WYN projects presented here enabled social learning for the participants, by providing them with knowledge, access and legitimacy to be active. Indeed, because they had been leading a young professional-focused session every year during the Stockholm World Water Week, the WYN and its partners had the legitimacy and the ability to lead a consultation. By confronting their vision of the role of young people in the water sectors, both senior and junior participants have learnt from the current situation and how to move forward. Likewise, by organizing a set of training and workshops on the SDGs dedicated to young people and other stakeholder groups, the WYN was able to gain insights into what specific capacities are missing among its members and among young people in general, and how a better understanding of the SDGs and of the sector can lead to action. Finally, the Kenyan project demonstrates that local and scientific knowledge is complementary if a structured stakeholder engagement and collaborative approach is followed. For knowledge to be co-created and innovations to be accepted and implemented, there is the need to involve the end users and understand their perceptions, concerns and needs. In this project, community members and young scientists converged at a particular time to learn from each other and to share their experiences. The collaborative process allowed community members to better understand the situation regarding the El Niño phenomenon. Moreover, it helped young scientists get insight into the characteristics, specificities, and mental and cultural models of community members regarding disaster-risk management. They could then build on this knowledge and devise actions for the prevention of and responses to disaster.

Changes in behaviours and actions resulting from new understandings

As a result of the projects presented here, and of similar work, the increased number of youth-led fora and sessions organized by the WYN and/or with other youth-led organizations at international events demonstrates a change in behaviour of international agencies and institutions. The shift in the set-up of these fora and sessions is also a clear indicator of this change. A few years ago, youth-led sessions focused on ‘why’ young people needed to participate in international events and global processes. Today, and the session described in this article is an example, youth-led sessions focus mainly on the ‘how’: what is the role of young people in shaping the OECD water governance

principles (Cumiskey, Hoang, Suzuki, Pettigrew, & Herrgård, 2015). They even went a step further. They are already looking for ways that young people can contribute: how can the OECD water governance principles be used for youth-led water operational projects? The change in behaviour can also be observed in the greater number of senior professionals attending youth-led sessions, and the number of sessions being hosted by 'senior-led' agencies and youth-led organizations.

A similar change of behaviours can be observed in the implementation of the SDGs and the Sendai Framework for Disaster Risk Reduction. Since the start of preparation of the 2030 Agenda for Sustainable Development, the number of programmes and financial mechanisms that support 'youth-to-youth' capacity development, co-creation and sharing of knowledge and youth-led initiatives has significantly increased. The projects presented in this article are concrete illustrations of this trend. The ERASMUS+ programme funded by the European Union, by which the YiA4SDG project was supported, is a good example. Likewise, the Youth Science-Policy Interface Platform, led by the United Nations Major Group for Children and Youth, supports the share of knowledge generated by multisector young and early career scientists, engineers, practitioners and policy makers relevant to the science-policy-practice nexus for sustainable development. The disaster-risk reduction project in Kenya is a successful example of the science-practice nexus.

An emergent property of the process to transform the situation

A transformation is also visible in the greater cooperation between young people and different youth-led organizations. Social learning at local and global scales has helped clarify the roles, dependencies, strengths and challenges of different youth-led organizations. This process has facilitated the convergence of positions and finding common points for collaboration. The three example cases related to the WYN in this article serve to demonstrate this transformation. The consultation at the World Water Week was organized by the WYN in collaboration with another youth-led organization, the World Youth Parliament for Water. The YiA4SDG project is the result of a consortia of eight youth-led organizations from Europe and Asia. Finally, the disaster-risk reduction project demonstrates the success of multi-scale collaboration (from global to local) as well as between policy makers (the United Nations Major Group for Children and Youth), young scientists (two WYN and five Kenyan young researchers) and practitioners (local community members).

Discussion

Based on the case-specific results presented above, we have collected 'lessons learned' for each of the elements in the dynamics of stakeholder engagement and social learning. These are summarized in [Table 2](#) and discussed below.

Our findings demonstrate that the distinct modalities for stakeholder engagement explored in these cases require more than a top-down decision to make them work as well as to reap the benefits of social learning.

In line with the OECD principle of stakeholder engagement, the UK and WeSenseIt cases clearly aimed to recognize 'the range of actors with a stake in a situation and

Table 2. Overview of lessons learned from each case.

	UK	Water Youth Network	WeSenseIt
Lessons about 'Who, what, where, when, how and why?'	<ul style="list-style-type: none"> Participants were drawn from policy and practitioner communities. The high general level of expertise and familiarity with workshop-type settings meant that a complex inquiry process was possible in the short time available. A more 'public' event would have required more resourcing and time. The reason for the stakeholder involvement arose from invitations to the researchers to convene the inquiry process. This institutional support and endorsement had the advantage of encouraging other stakeholders to participate. But there is a risk of compromising the independence of the research. The relatively short time frame of the inquiries reported here means that discussions were inevitably curtailed at times. However, the inquiry design and process did allow the substantive elements to emerge. 	<ul style="list-style-type: none"> Even a once-a-year event (i.e. Stockholm World Water Week) can aid awareness-raising and capacity development and, as a result, collective action towards sustainable development. Also serves to enhance collaboration between multi-scale organizations as well as between policy makers, young scientists and practitioners, and as intergenerational dialogue. 	<ul style="list-style-type: none"> Developing observatories relies on multi-lateral, not just bilateral interactions among stakeholders.
Lessons about the convergence of goals (expressed as purpose)	<ul style="list-style-type: none"> The inquiry process provided a structured dialogue on the <i>purpose</i> of water governance and identification of core themes for water governance systems. The ability to formulate and agree on a definition of the purpose of current and future water governance indicates convergence of goals at the system level. Convergence does not mean there is always complete agreement, but a recognition of the systemic relationships between different stakeholders' goals, which can then lead to more concerted forms of action. 	<ul style="list-style-type: none"> The creation of a structured approach for engaging under-represented groups such as young people and local communities is critical for reducing risks, enhancing trust and as a result unlocking their participation in decision-making processes. 	<ul style="list-style-type: none"> The extent to which convergence of goals can be achieved is highly case-dependent and locally defined.

(Continued)

	UK	Water Youth Network	WeSenseIt
Lessons about the process of co-creation of knowledge which provides insights into the causes of a situation and the means of its possible transformation	<ul style="list-style-type: none"> • Process requires an element of trust and willingness to cooperate. • Collaborative process and tasks were challenging in terms of revealing assumptions about the situation, promoting dialogue and integrating different perspectives. • Making boundary choices about the relevance of issues was difficult. • Co-creating and using system diagrams helped reveal the complexity of the situation and the realization that no individual or organization could manage this complexity in isolation. • Water governance is not a 'thing' or single entity that can be added to a situation to bring about improvement. Instead, water governance can be thought of as a learning system. 	<ul style="list-style-type: none"> • Positioning WYN as a trusted youth-led organization has required the organization of successful intergenerational sessions at international events since 2013. • The WYN members had to constantly demonstrate their professionalism. 	<ul style="list-style-type: none"> • Different actors have differing perceptions of flood risk, and citizen observatories can serve to create a more level playing field. • Most interactions still took place offline, not online. • It takes time to build/transfer trust and responsibilities into the online environment, especially since this goes hand in hand with the responsibility to respond.
Lessons about the changes in behaviours and actions	<ul style="list-style-type: none"> • Changes in behaviours and actions may take time to develop and become 'acceptable' to individuals and organizations. • Not all changes in understanding and practices can be realized by participants. • Evidence of changes is therefore difficult to collect with short-term interventions. However, in the UK case, participants went on to organize other forms of stakeholder involvement into related issues, suggesting that a new form of practice was engendered. 	<ul style="list-style-type: none"> • Changes in behaviours require time and perseverance. 	<ul style="list-style-type: none"> • The changes in behaviour triggered by the observatories took time to materialize (beyond the project life time).

(Continued)

Table 2. (Continued).

	UK	Water Youth Network	WeSenseIt
Lessons about the emergent property of the process to transform a situation	<ul style="list-style-type: none"> The conditions for social learning can be enabled and facilitated, but there are no guarantees of social learning or any other collaborative element (e.g. convergence of goals). Social learning is neither a magic ingredient nor an assumed outcome. 	<ul style="list-style-type: none"> Collaboration among organizations working with under-represented groups, including youth-led organizations, is critical for strengthening the position of these groups. Enhancing trust and collaboration requires time and effort. However, already in the short term, the advantages of such collaboration are noticeable. This multi-scale and multi-sector collaboration can only be achieved with a well-defined social learning process. 	<ul style="list-style-type: none"> Citizen observatories provide new conditions for social learning but should not be seen as a panacea or as a 'quick fix' for stakeholder engagement. Demonstrated commitment of all stakeholders leads to trust. Ultimately, the potential for changing the role of citizens is highly dependent on the room that citizens are granted by authorities – but also on that claimed by citizen.

understanding their possibly diverse responsibilities' (OECD, 2015), while the WYN case is more concerned with ensuring the involvement of under-represented groups whose stakes may have been less evident in various decision-making processes.

Confirming the findings of Furber et al. (2016), the WeSenseIt case showed that stakeholder involvement is not only highly dependent on a sound understanding of stakeholder responsibilities. It also relies on the stakeholders' perceived gains from the collaboration – and is less successful with those stakeholders who perceive the resulting outcomes, such as additional responsibilities, as a loss. Careful attention needs to be paid during the engagement process to how to address individual (perceived) losses and to what extent these may be offset by expected collective gains.

All three cases clearly demonstrate that regardless of the type of stakeholder group involved and the type of intervention chosen, social learning and stakeholder engagement in water governance take considerable time to result in changes in behaviour and actions. Sufficient levels of trust, ownership and continuity are the basis for achieving desired outcomes of social learning. These can be obtained in different ways, though, as illustrated by the well-defined social learning processes of the WYN and the UK cases compared to the exploratory social learning process of WeSenseIt. Nevertheless, generating trust in the ICT-enabled stakeholder engagement of WeSenseIt did encounter additional hurdles.

Moreover, the starting point for social learning appears to be dependent not only on identifying the process of decision making and stakeholder inputs, as indicated by the OECD principles, but also on ensuring that all stakeholders have access to the same information. This in itself is an elaborate process and goes hand in hand with beginning to agree on issue boundaries.

The WYN case presented here shows the dependence of stakeholder engagement on a structured approach in order to include under-represented groups, which requires careful planning of time and resources. This extends beyond water governance specifically to the attainment of the Sustainable Development Goals more generally.

Regarding the contextualization of stakeholder engagement initiatives, our results show that stakeholder engagement, when understood and designed as a social learning process, can lead to shared understanding and concerted actions to improve water governance. Our analysis that stakeholder engagement is *purposeful* – i.e. not a state but an ongoing dynamic – accords well with the emphasis set out in the OECD principle. When 'assessing the process and outcomes of stakeholder engagement to learn, adjust and improve accordingly', it is arguably most salient to focus on how to foster collective learning and cooperation among stakeholders to leverage the potential for sustainable transformation and change. This has implications for rethinking stakeholder engagement in a range of water governance situations to avoid top-down, 'ticking the box' processes which fail to recognize the potential for situation improvement.

Conclusions

In this article, prompted by the OECD principle of stakeholder engagement, we asked a central question: How should we conceptualize and enact stakeholder engagement? Although it is an ex post analysis, based on the findings reported here and consistent with the literature, we find that stakeholder engagement is not just about participation. As Collins and Ison (2009) note, participation is a requirement but not, of itself,

sufficient for social learning. Our analysis suggests that a key consideration is to ask: stakeholder engagement *for what purpose?* This is not idle speculation but requires consideration of the ethics, process, participants, roles and expected outcomes of stakeholder engagement, as reflected in the OECD principle.

A reframing of stakeholder engagement as a process of social learning opens up more possibilities than just participation as it carries an explicit purpose which underpins design and process considerations. It also opens up discussion of the responsibilities of those involved as initiators, designers, facilitators, participants and ‘recipients’ of the process. If no changes are likely, due to, for example, prohibitive institutional arrangements, then inviting stakeholders into a process predicated on social learning and dialogue is ethically questionable. It follows that while designers and facilitators cannot be held to account if the stakeholder engagement ‘fails’ in terms of social learning, they are responsible for ensuring that the enabling conditions for social learning are met.

In offering insights into a wide range of contexts, levels and processes relating to water governance and stakeholder engagement, our research findings suggest that the term has, at last, begun to be appreciated in a more sophisticated way, with due recognition for the potential for learning. Pitfalls and constraints remain, not least concerns about time, resources, replicability and representation. Nevertheless, stakeholder engagement designed as social learning offers much scope for developing informed and outcome-oriented contributions to water policy design and implementation.

Acknowledgements

The WYN projects were led by several teams and under different sources. The World Water Week consultations received funding support from the Asian Development Bank, IHE Delft and SIWI. We appreciate the guidance from Chris Morris and Ponce Samandiego, and the work of our colleagues: Rozemarijn ter Horst, Cecilia Alda, Veronica Diaz Sosa, Veronica Minaya, Ibrahim Bah, Tlhoriso Morienyane, Bianca Magali Benitez Montiel, Alejandra Molina and Shabana Abbas, as well as the collaboration of the World Youth Parliament for Water. The YiA4SDG project received funding from the European Union (grant agreement 2015-3597). We acknowledge the work of our colleague Shabana Abbas and the collaboration of our partner organizations. Finally, we are grateful for the excellent research undertaken by our colleagues Jack Wachira and Lydia Cumiskey, as well as the support from the local young researchers in the research project in Kenya.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The WeSenseIt case reported in this paper is part of the WeSenseIt project which has received funding from the European Union [Grant no. 308429.ct.] The UK case is informed by the Climate Adaptation and Water Governance Project (<http://www.cadwago.net>), funded by Riksbankens Jubileumsfond, Compagnia di San Paolo, and VolkswagenStiftung, as part of the Europe and Global Challenges programme [Grant no. GC12-1545:1].

References

- Adger, W. N., Paavola, J., Huq, S., & Mace, M. J. (2006). *Fairness in adaptation to climate change*. Cambridge, London: The MIT Press.
- Akhmouch, A., & Clavreul, D. (2016). Stakeholder engagement for inclusive water governance: “Practicing What We Preach” with the OECD water governance initiative. *Water*, 8(5), 204.
- Arnstein, S. (1969). A ladder of citizen participation. *J Am Plan Assoc*, 35(4), 216–224.
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Barreteau, O., Bots, P. W. G., & Daniell, K. A. (2010). A framework for clarifying “participation” in participatory research to prevent its rejection for the wrong reasons. *Ecology and Society*, 15(2), 1. doi: 10.5751/ES-03186-150201
- Basco-Carrera, L., Warren, A., van Beek, E., Jonoski, A., & Giardino, A. (2017). Collaborative modelling or participatory modelling? A framework for water resources management. *Environmental Modelling & Software*, 91, 95–110. doi:10.1016/j.envsoft.2017.01.014
- Behagel, J., & Turnhout, E. (2011). Democratic legitimacy in the implementation of the water framework directive in the Netherlands: Towards participatory and deliberative norms? *Journal of Environmental Policy & Planning*, 13(3), 297–316. doi:10.1080/1523908X.2011.607002
- Blackmore, C., Ison, R., & Jiggins, J. (2007). Social learning: An alternative policy instrument for managing in the context of Europe’s water. *Environmental Science & Policy*, 10(6), 493–498. doi:10.1016/j.envsci.2007.04.003
- Bourget, L. (Ed.). (2011). *Converging waters: Integrating collaborative modeling with participatory processes to make water resources decisions*. Washington DC: Institute for Water Resources, U.S. Army Corps of Engineers.
- Bruns, B. (2003) Water Tenure Reform: Developing an Extended Ladder of Participation, paper presented at the ‘Politics of the Commons: Articulating Development and Strengthening Local Practices’ conference, July 11-14, 2003, Chiang Mai, Thailand
- Checkland, P. (1981). *Systems thinking, systems practice*. Chichester: John Wiley.
- Checkland, P., & Scholes, J. (2002). *Soft Systems methodology in action*. Chichester: John Wiley.
- Cleaver, F. (1999). Paradoxes of participation: Questioning participatory approaches to development. *Journal of International Development*, 11(4), 597–612.
- Cockerill, V. C., Tidwell, V. C., Passell, H. D., & Malczynsky, L. A. (2007). Cooperative modelling lessons for environmental management. *Environmental Practice*, 9(1), 28–41. doi:10.1017/S1466046607070032
- Collins, K., Blackmore, C., Morris, R., & Watson, D. (2007). A systemic approach to managing multiple perspectives and stakeholding in water catchments: Some findings from three UK case studies. *Environmental Science and Policy*, 10(6), 564–574. doi:10.1016/j.envsci.2006.12.005
- Collins, K., & Ison, R. (2009). Jumping off Arnstein’s Ladder: Social learning as a new policy paradigm for climate change adaptation. *Environmental Policy and Governance*, 19(6), 358–373. doi:10.1002/eet.v19:6
- Colvin, J., Blackmore, C., Chimbuya, S., Collins, K., Dent, M., Goss, J., ... Seddaiu, G. (2014). In search of systemic innovation for sustainable development: A design praxis emerging from a decade of social learning inquiry. *Research Policy*, 43, 760–771. doi:10.1016/j.respol.2013.12.010
- Cumiskey, L., Hoang, T., Suzuki, S., Pettigrew, C., & Herrgård, M. M. (2015). Youth participation at the Third UN World Conference on disaster risk reduction. *International Journal of Disaster Risk Science*, 6(2), 150–163. doi:10.1007/s13753-015-0054-5
- DeSario, J., & Langton, S. (1987). Citizen participation and technocracy. In L. DeSario & S. Langton (Eds.), *Citizen participation in public decision making*. New York: Greenwood Press.
- Edelenbos, J., & Klijn, E.-H. (2006). Managing stakeholder involvement in decision-making: A comparative analysis of six interactive processes in the Netherlands.. *Journal of Public Administration Research and Theory*, 16(3), 417–446. doi:10.1093/jopart/mui049

- Edelenbos, J., Van Schie, N., & Gerrits, L. (2008). Democratic anchorage of interactive governance: Developing institutional interfaces in water governance. In Proceedings 2008 conference of the Political Science Association. <http://www.psa.uk/proceedings.aspx>.
- Evers, M., Jonoski, A., Maksimovič, Č., Lange, L., Ochoa Rodriguez, S., Teklesadik, A., ... Makropoulos, C. (2012). Collaborative modelling for active involvement of stakeholders in urban flood risk management. *Natural Hazards and Earth System Science*, 12(9), 2821–2842. doi:10.5194/nhess-12-2821-2012
- Fischer, F. (2000). *Citizens, experts, and the environment: The politics of local knowledge*. Durham: Duke University Press.
- Foster, N., Collins, K., Ison, R., & Blackmore, C. (2016). Water Governance in England: Improving understandings and practices through systemic co-inquiry. *Water*, 8, 540–556. doi:10.3390/w8110540
- Fung, A. (2006). Varieties of participation in complex governance. *Public Administration Review*, 66, 66–75. doi:10.1111/puar.2006.66.issue-s1
- Furber, A., Medema, W., Adamowski, J., Clamen, M., & Vijay, M. (2016). Conflict management in participatory approaches to water management: A case study of lake ontario and the St. Lawrence River Regulation. *Water* 2016, 8(7), 280–296.
- Greenwood, D. J., & Levin, M. (1998). *Introduction to action research: Social research for social change*. Thousand Oaks, CA: Sage Publications.
- Gunderson, L. H. (2003). Adaptive dancing: Interactions between social resilience and ecological crises. In F. Berkes, J. Colding, & C. Folke (Eds.), *Navigating social-ecological systems. Building resilience for complexity and change* (pp. 33–52). Cambridge: Cambridge University Press.
- GWP (2000). Integrated water resources management, TAC Background Papers. Author.
- Hare, M. (2011). Forms of participatory modelling and its potential for widespread adoption in the water sector. *Environmental Policy and Governance*, 21, 386–402. doi:10.1002/eet.590
- Hare, M., Letcher, R. A., & Jakeman, A. J. (2003). Participatory modelling in natural resource management: A comparison of four case studies. *Integrated Assessment*, 4(2), 62–72. doi:10.1076/iaij.4.2.62.16706
- Hisschemöller, M. (1993). *De Democratie van problemen, de relatie tussen de inhoud van beleidsproblemen en methoden van politieke besluitvorming*. Amsterdam: VU-Uitgeverij.
- Hurlbert, M., & Gupta, J. (2015). The split ladder of participation: A diagnostic, strategic, and evaluation tool to assess when participation is necessary. *Environmental Science & Policy*, 50, 100–113. doi:10.1016/j.envsci.2015.01.011
- Irvin, R. A., & Stansbury, J. (2004). Citizen participation in decision making: Is it worth the effort? *Public Administration Review*, 64(1), 55–65. doi:10.1111/puar.2004.64.issue-1
- Ison, R. (2010). Systemic inquiry. In *Systems practice: How to act in a climate-change world* (pp. 243–265). London: Springer.
- Ison, R., Röling, N., & Watson, D. (2007). Challenges to science and society in the sustainable management and use of water: Investigating the role of social learning. *Environmental Science & Policy*, 10(6), 499–511. doi:10.1016/j.envsci.2007.02.008
- Ison, R. L., Collins, K., & Wallis, P. (2015). Institutionalising social learning: Towards systemic and adaptive governance. *Environmental Science & Policy*, 53(Part B), 105–117. doi:10.1016/j.envsci.2014.11.002
- Jonoski, A., & Evers, M. (2013). Sociotechnical framework for participatory flood risk management via collaborative modeling. *International Journal of Information Systems and Social Change (IJISSC)*, 4(2), 1–16. doi:10.4018/IJISSC
- Joshi, S., & Wehn, U. (2017). From assumptions to artifacts: Unfolding e-participation within multi-level governance. *Electronic Journal of e-Government*, 15(2), 116–129.
- Lewin, K. (1946). Action research and minority problems. *Journal of Social Issues*, 2(4), 34–46. doi:10.1111/josi.1946.2.issue-4
- Loucks, D. P., Van Beek, E., Stedinger, J. R., Dijkman, J. P., & Villars, M. T. (2005). *Water resources systems planning and management: An introduction to methods, models and applications*. Paris: UNESCO.

- Mayer, I. S., van Bueren, E. M., & Bots, P. (2005). Collaborative decision making for sustainable urban renewal projects: a simulation-gaming approach. *Environment and Planning B: Urban Analytics and City Science*, 32(3), 403–423.
- Mostert, E., Pahl-Wostl, C., Rees, Y., Searle, B., Tàbara, D., & Tippett, J. (2007). Social learning in European river-basin management: Barriers and fostering mechanisms from 10 river basins. *Ecology and Society*, 12(1), art. 19. doi:10.5751/ES-01960-120119
- OECD. (2015). Stakeholder engagement for inclusive water governance, OECD Studies on Water, Author, Paris.
- Pahl-Wostl, C., & Hare, M. (2004). Processes of social learning in integrated resources management. *Journal of Community & Applied Social Psychology*, 14(3), 193–206. doi:10.1002/(ISSN)1099-1298
- Pahl-Wostl, C., Tàbara, D., Bouwen, R., Craps, M., Dewulf, A., Mostert, E., . . . Taillieu, T. (2008). The importance of social learning and culture for sustainable water management. *Ecological Economics*, 64(3), 484–495. doi:10.1016/j.ecolecon.2007.08.007
- Reed, M. (2008). Stakeholder participation for environmental management: A literature review. *Biological Conservation*, 141(10), 2417–2431. doi:10.1016/j.biocon.2008.07.014
- Rinaudo, J. D., & Garin, P. (2005). The benefits of combining lay and expert input for water-management planning at the watershed level. *Water Policy*, 7(3), 279–293.
- Röling, N. (2002). Beyond the aggregation of individual preferences. In C. Leeuwis & R. Pyburn (Eds.), *Wheelbarrows full of frogs. Social learning in rural resource management* (pp. 25–47). Aasen: Koninklijke Van Gorcum.
- Rowe, G., & Frewer, L. (2004). Evaluating public participation exercises: A research agenda. *Science, Technology, & Human Values*, 29(4), 512–556. doi:10.1177/0162243903259197
- Sadoff, C. W., & Grey, D. (2005). Cooperation on international rivers: A continuum for securing and sharing benefits. *Water International*, 30(4), 420–427. doi:10.1080/02508060508691886
- Scholz, G., Dewulf, A., & Pahl-Wostl, C. (2014). An analytical framework of social learning facilitated by participatory methods. *Journal of Systemic Practice and Action Research*, 27(6), 575–591. doi:10.1007/s11213-013-9310-z
- SLIM. 2004a. Stakeholders and stakeholding in integrated catchment management and sustainable use of water. SLIM Policy Brief No.2. SLIM, UK.
- SLIM. 2004b. SLIM Framework: Social Learning as a Policy Approach for Sustainable Use of Water, SLIM.
- Sørensen, E. (2002). Democratic theory and network governance. *Administrative Theory and Praxis*, 24(4), 693–720.
- Sørensen, E., & Torfing, J. (Eds.). (2007). *Theories of democratic network governance*. New York: Palgrave Macmillan.
- van Buuren, A., Driessen, P., Teisman, G., & van Rijswijk, M. (2014). Toward legitimate governance strategies for climate adaptation in the Netherlands: Combining insights from a legal, planning, and network perspective. *Regional Environmental Change*, 14, 1021–1033.
- Voinov, A., & Bousquet, F. (2010, November). Modelling with stakeholders. *Environmental Modelling & Software*, 25(11), 1268–1281. doi:10.1016/j.envsoft.2010.03.007
- Voinov, A., Kolagani, N., McCall, M. K., Glynn, P. D., Kragt, M. E., Ostermann, F. O., . . . Ramu, P. (2016, March). Modelling with stakeholders – Next generation. *Environmental Modelling & Software*, 77, 196–220. doi:10.1016/j.envsoft.2015.11.016
- von Korff, Y., Daniell, K. A., Moellenkamp, S., Bots, P., & Bijlsma, R. M. (2012). Implementing participatory water management: Recent advances in theory, practice, and evaluation. *Ecology and Society*, 17(1), art. 30. doi:10.5751/ES-04733-170130
- Watson, N. (2014). IWRM in England: Bridging the gap between top-down and bottom-up implementation. *International Journal of Water Resources Development*, 30(3), 445–459. doi:10.1080/07900627.2014.899892
- Wehn, U., & Evers, J. (2015). The social innovation potential of ICT-enabled citizen observatories to increase eParticipation in local flood risk management. *Technology in Society*, 42, 187–198. doi:10.1016/j.techsoc.2015.05.002

- Wehn, U., McCarty, S., Lanfranchi, V., & Tapsell, S. (2015). Citizen observatories as facilitators of change in water governance? Experiences from three European cases, Special Issue on ICTs and Water. *Journal of Environmental Engineering and Management*, 14(9), 2073–2086.
- Wehn, U., Rusca, M., Evers, J., & Lanfranchi, V. (2015). Participation in flood risk management and the potential of citizen observatories: A governance analysis. *Environmental Science and Policy*, 48(April), 225–236. doi:10.1016/j.envsci.2014.12.017
- Wendling, C., Radisch, J., & Jacobzone, S. (2013). The use of social media in risk and crisis communication. OECD Working Papers on Public Governance, No. 24, OECD Publishing, Paris.
- Woodhill, J., & Röling, N. (1998). The second wing of the eagle: The human dimension in learning our way to more sustainable futures. In N. G. Roling & M. A. E. Wagemakers (eds), *Facilitating sustainable agriculture. Participatory learning and adaptive management in times of environmental uncertainty* (pp. 46–71). Cambridge: Cambridge University Press.
- Zeitoun, M., & Mirumachi, N. (2008). Transboundary water interaction I: Reconsidering conflict and cooperation. *International environmental agreements: Politics, Law and Economics*, 8(4), 297–316.