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Participation in flood risk management and the potential of citizen observatories: A governance analysis

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ABSTRACT

The implementation of the European Flood Directive 2007/60/EC requires the establishment of public participation mechanisms to ensure citizens' involvement in the flood management cycle. This raises questions on how to achieve this goal and successfully translate the directive into meaningful and effective participation. Innovative means, such as citizen observatories enabled by information and communication technologies, have the potential to provide citizens with a substantially new role in decision-making. In this paper, we present a framework developed for analysing the potential for participation via ICT-enabled citizen observatories and undertake a comparative analysis of the UK, the Netherlands and Italy. Expository and qualitative research was undertaken in the three case study areas, with the aim of identifying and comparing the transposition of the EU Flood directive and the mechanisms in place for citizens' participation during different phases of the disaster cycle (prevention, preparedness, response, and recovery). Our analysis of the transposition of legal obligations for citizen participation shows that implementation is limited when examining both the respective roles and types of interactions between citizen and authorities and the impact of citizen participation on decision-making. Different authorities have differing perceptions of citizen participation in flood risk management in terms of their roles and influence. Our results also indicate that these perceptions are related to the importance that the authorities place on the different stages of the disaster cycle. This understanding is crucial for identifying the potential of citizen observatories to foster greater citizen engagement and participation.

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1. Introduction

Despite the progress of engineering works for flood disaster reduction over the last twenty years, flooding continues to be a major challenge (Yamada et al., 2010) and incidences of floods have been on the rise, responsible for more than half of all

disaster-related fatalities and a third of the economic loss from all natural catastrophes (White, 2000 as cited by Bradford et al., 2012). Nowadays, flood risk management approaches focusing on non-structural measures, such as improved land-use planning, relocation, flood proofing, flood forecasting and warning and insurance are advocated (Bradford et al., 2012). One of the approaches being practiced by several European

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countries is integrated flood risk management, which considers the full disaster cycle in the management and prevention of flood disasters (European Environment Agency, 2010). Moreover, the importance of stakeholder participation in decision-making, and in flood risk management in particular, has been recognized by international and regional treaties such as the Aarhus Convention (1999), which promotes public participation in decision-making on environmental issues, and the European Flood Directive 2007/60/EC, which requires the establishment of public participation mechanisms to ensure citizens' involvement in the flood management cycle. Yet questions can be raised as to how to achieve this goal and successfully translate these requirements into meaningful and effective participation. Innovative means, such as citizen observatories enabled by information and communication technologies (ICTs) (e.g. sensor technologies and social media), have the potential to provide new ways (and perhaps even new paradigms) of participation, whilst at the same time generating relevant information and promoting demand-driven policy responses (Holden, 2006; Rojas-Calderas and Corona Zambrano, 2008). However, similar to other technologies, its realization will be socially shaped, including by local patterns of participation.

We first present the framework for analysing the potential for participation via ICT-enabled citizen observatories and then undertake a comparative analysis of governance structures, institutions and mechanisms for participation in the UK, the Netherlands and Italy. We analyze the transposition of the European Flood Directive in these different contexts and examine the potential for increased citizen participation in flood risk management through citizen observatories. The paper draws on empirical and expository research in three case study areas in the UK, the Netherlands and Italy, undertaken within the WeSenseIt¹ project. The remainder of this paper is structured as follows: Section 2 presents a literature-based discussion on horizontal modes of governance and the potential for citizen participation, enhanced through technological developments. In Section 3 we present the framework developed for analysing ICT-enabled citizen observatories. Sections 4 and 5 introduce the three cases and present the key findings. We conclude with a discussion of the results in Section 6.

2. Horizontal modes of governance and citizens participation

The concept of water governance has quickly gained popularity in policy dialogues since its emergence in the 70s. It captures “the processes and institutions through which decisions are made related to water” (Lautze et al., 2011, p. 4). In contrast to ‘government’, ‘governance’ highlights a shift from state-centred management towards ‘a greater reliance on horizontal, hybrid and associational forms of government’, involving a

broader network of actors, including citizens (Hill and Lynn, 2005, p. 173; Swyngedouw, 2005). Water governance therefore consists of the processes of decision-making and definition of goals by a range of actors, while water management (and flood risk management more specifically) consists of targeted activities to attain such goals. Analytical approaches for examining (water) governance processes, and participation, stem from a variety of disciplines but typically focus on institutional aspects and range from methodologically pragmatic (e.g. the OECD (2011) multi-level water governance analysis) to very comprehensive ones (e.g. Saravanan, 2008; Pahl-Wostl, 2009; Pahl-Wostl et al., 2010; Rijke et al., 2012). The structural elements of water governance consist of four dimensions: institutions, actor networks, multi-level interactions, governance modes (Pahl-Wostl, 2009).

Parallel with the rise of horizontal ‘modes of governance’, relying on networks of actors and individuals, is the increased emphasis on stakeholder participation. Participation approaches have progressed through a series of phases (Reed, 2008): awareness raising in the 1960s, incorporation of local perspectives in the 1970s, recognition of local knowledge in the 1980s, participation as a norm as part of the sustainable development agenda of the 1990s, subsequent critiques and recently a ‘post-participation’ consensus regarding best practice. Although participatory approaches are commonly presented as antidotes for a lack of legitimacy of traditional policymaking approaches and as a means for leading to more informed and effective policies, several studies have also shown that many participatory approaches fail to do so (Edelenbos and Klijn, 2006; Behagel and Turnhout, 2011). Arnstein’s (1969) seminal article ‘The ladder of citizen participation’ serves as a starting point for most debates on quality and purpose of citizen participation. Along the ‘ladder’, different forms of participation are ranked from manipulation (the lowest in the group of non-participation steps) to citizen control (the highest step; also the highest degree of citizen power). The ladder, thus, implies that participation is an ends rather than a means. Fung (2006) argues that the ladder mixes empirical scaling with normative approval while excluding important elements of the context and, therefore, the desirability within which participation may take place. It also does not take into account links between (i) the goals of involvement, (ii) those who actually participate and (iii) the ways in which they are invited to participate (Tritter and McCallum, 2006). Fung (2006) proposed an alternative, distinguishing between three dimensions of public decision mechanisms, namely the scope of participation (who participates: from government representatives to the general public (citizens), the mode of communication and decision (how participants interact and what role they play), and the extent of authority (participation for personal benefit only (individual education), up to direct authority). The resulting three-dimensional ‘democracy cube’ provides, according to Fung (2006), a tool for understanding the potential and limits of participation. Different participatory mechanisms can be situated in the cube and compared in order to understand their suitability for addressing specific governance problems.

More recently, research has focused on the influence of technological developments, such as geographic information systems, on public participation (Wehn and Evers, 2014; White et al., 2010). The innovative combination of existing and new

¹ WeSenseIt is a European Research project (2012–2016) developing, implementing and testing citizen observatories of water and flooding in three cases studies located in Italy, the United Kingdom and The Netherlands. More information about the project can be found at www.wesenseit.eu.

Table 1 – Dimensions of citizen observatories.

| Dimensions | Range |
|---|--|
| Sensors and transmission | Physical sensor ↔ social sensor |
| Stakeholders | Authorities ↔ citizens |
| Area of application | Physical environment ↔ human behaviour |
| Purpose of citizen observatory | Protect environment ↔ strengthen governance |
| System integration | Stand-alone ↔ integrated |
| Measurement | Objective ↔ subjective |
| Implementation | Bottom up ↔ top-down |
| Communications paradigm | Uni-directional ↔ interactive |
| Citizen participation in governance processes | Implicit data provision ↔ technical expertise Individual education ↔ direct authority |

Source: Adapted from Ciravegna et al. (2013).

sensor technologies and other ICTs such as mobile apps, Web 2.0 services and web applications has given rise to so-called citizen observatories, in which the observations of ordinary citizens, and not just those of scientists and professionals, can form an integral part of (earth) observation and decision-making. Citizen observatories can vary, for example, in terms of their area of application (observing the physical environment such as particular species, the weather, astronomical phenomena or even human behaviour such as monitoring political unrest), collecting objective or subjective measurements, from bottom up to top down implementation, and using uni-directional to interactive communication paradigms between citizens and data ‘processors’ (Ciravegna et al., 2013) (see Table 1). Despite the acclaimed potential, citizen observatories are a recent phenomenon and therefore little is known about the potential for citizen participation that they offer.

3. A framework for analysing citizen participation via ICT-enabled observatories

For our purpose of gauging the potential of ICT-enabled citizen observatories for increased citizen participation in flood risk management, we developed a framework to undertake a comparative analysis across cases (see Fig. 1). The framework builds on the democracy cube to classify the different dimensions and “range of institutional possibilities for public participation” (Fung, 2006, 66). These dimensions are then adapted to fully capture the possibilities of ICT-enabled citizen observatories. The key aspect of these observatories is the direct involvement of user communities in the data collection process: it enables citizen involvement by collecting data via an innovative combination of easy-to-use sensors and monitoring technologies as well as harnessing citizens’ collective intelligence, i.e. the information, experience and knowledge embodied within individuals and communities communicated via social media (e.g. Twitter, Facebook, etc.) and dedicated mobile applications (Wehn and Evers, 2014; Lanfranchi et al., 2014; Ciravegna et al., 2013). In this scenario, citizen involvement can span from data collection and provision (e.g. monitoring water levels using a range of sensors), feedback and knowledge exchanges (via mobile apps or online platforms) to actual involvement in decision-making (online or face-to-face) in order to harness environmental data and knowledge to effectively and efficiently manage flood risk. This provides the potential for a distinctly different role for citizens (i.e. involvement in data collection) compared to earlier conceptualisations of citizen participation in decision-making.

The ‘communication and decision’ dimension of our framework incorporates data collection possibilities so that it adequately captures the means of interaction and the roles that participants can now play in decision-making. An

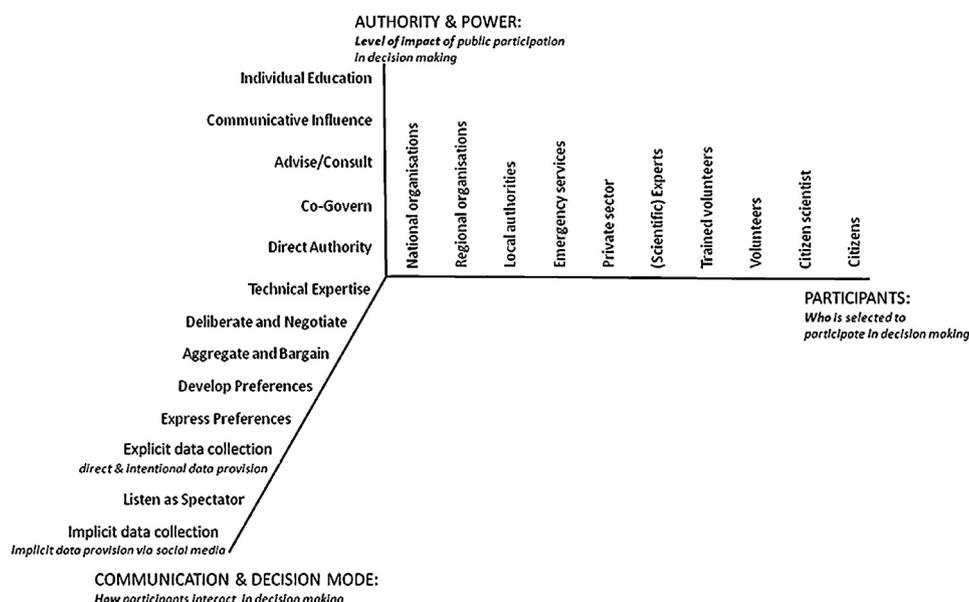


Fig. 1 – Citizen participation via ICT-enabled observatories framework.
Source: Adapted from Fung (2006).

‘implicit data provision’ role refers to citizen observations that are collected and mined from social media without citizens necessarily realizing that their observation about a local situation (e.g. a twitter posting about their basement being flooded) is being included in a decision-making process (e.g. informing the intelligence gathering of the emergency services). Secondly, the category ‘explicit data provision’ is included to capture the intended and volunteered observations by citizens, collected using photos, apps or dedicated sensor technology. Last, Fung’s (2006) ‘scope of participation’ dimension is adjusted to the specific stakeholders that may be involved in flood risk management and governance (ranging from citizens, citizen scientists, volunteers and trained volunteers, to various types of public sector institutions). This framework provides a basis for the collection and the qualitative interpretation of research results.

In our study, we distinguish between the different stages of flood risk management in which citizens are participating in decision-making. Disasters such as floods are not considered exceptional events in the sense that there seems to be a tendency for such events to recur and to be localized (Alexander, 2002). Emergency planning therefore intends to plan and prepare for such events in order to reduce the risks to human life and physical damages. The repetitive nature of disasters has resulted in distinct responses and these have been captured by the so-called disaster cycle. Specifically, we refer to the four stages preparation, response, recovery and mitigation (the last of which is mostly referred to as prevention in the European context). To fully understand citizen participation in flood risk management, therefore, distinct phases of the cycle need to be considered.

The conceptual framework was operationalized by translating the concepts into questions for a detailed protocol for semi-structured interviews and for the expository research. A systemic analysis of legislation at national and local level, EU

directives and International and regional Conventions was undertaken with the aim of identifying and comparing the mechanisms in place for citizens’ participation. The results of this analysis were triangulated through interviews with relevant local authorities, emergency services as well as regional (and, possibly, national) policy makers. Empirical research was carried out between May and November 2013 in the three case study locations of the WeSenseIt project (Doncaster in the UK, Delfland in the Netherlands, and Vicenza in Italy, see Fig. 2). In total, 16 face-to-face interviews were conducted. Additionally, focus group discussions were undertaken in each country with stakeholders involved in the flood risk management cycle. Cases also selectively draw on empirical material that was produced in the context of defining the technical requirements for the WeSenseIt platform and project reports. A comparative analysis of the three cases was undertaken in accordance with the “Citizen participation via ICT-enabled observatories Framework”.

4. Flood risk management in Doncaster, Delfland and Vicenza: an introduction

4.1. Doncaster (UK)

The city of Doncaster is located in the county of South Yorkshire in England, along the river Don. This town has suffered from significant flooding events over many years, including the large-scale floods in 2007 that affected much of the United Kingdom. Both, the topography of the county of South Yorkshire and its network of river catchments contribute to the flood risk of this region. It is liable to fluvial (river), pluvial (rain induced) and marine (sea) flooding caused by heavy rainfall in the catchment of the river Don and tidal fluctuations and potential floods from dam failure in the



Fig. 2 – Location of case studies.

valleys to the North and West of the county (which contain 17 major reservoir dams). Doncaster Metropolitan Borough has some 320,000 inhabitants; according to the local authorities, some 25,000 properties are currently at risk from river Don flooding.

Generally, in this case, citizen participation consists of a variety of citizen groups (volunteers, elected citizens, citizen scientists and communities) and rests on a range of communication modes (from listening as a spectator to expressing and developing preferences on specific issues). The flood wardens (volunteer representatives from the local communities, initiated by the Doncaster Borough Metropolitan Council (DBMC) following the 2007 floods and the criticisms raised by the Pitt report (Pitt, 2008)) are active in specific, flood-affected areas (neighbourhoods) of Doncaster and involved in the higher level Council and in regional committees. They support the work of both, the Environment Agency and DMBC, by reporting and informing on flood-related issues (e.g. obstructions/overgrowing of waterways, etc.) on the basis of regular inspections of the local area. They also function as intermediaries between the Council and the communities for awareness-raising about flood-related issues. The range of formal institutions pertaining to flood risk management in Doncaster is broad, even after the recent consolidation of legislation at the national level (e.g. Defra, 2009a,b, 2010; EA, 2011). These institutions have implications for which and how different actors involved in flood risk management in Doncaster² collaborate and make decisions related to the different phases of flood risk management.

4.2. Delfland (NL)

The water authority Delfland is located in the province of South Holland and is bordered by the North Sea and the Nieuwe Waterweg (New Waterway – main deep water access canal to the Port of Rotterdam). Its administrative area covers amongst others the municipalities of The Hague, and large parts of Rotterdam. The area has a size of 41,000 hectares on which 1.4 million people live and work. It is one of the most densely populated and industrialized areas of the Netherlands. The water authority is tasked with water quantity and quality issues; maintaining safe dikes and dunes (both sea and river based flood control), and operation of several wastewater treatment plants. The Westland municipality is characterized by intensive greenhouse horticulture and is located in the South-Western tip of Delfland. During peak rainfall, some neighbourhoods and greenhouse areas experience problems and economic damages from flooding. Major flooding in the Westland area in 1998 caused an estimated damage of about €50 million (NBDC, 1998).

The Netherlands has a highly institutionalized flood risk management system (Slomp, 2012; MIE and MEAAI, 2011; NBW, n.d.). Decisions about spatial planning and flood risk management related issues are made by the water board and the municipal council (both are elected bodies). In projects for

flood risk management citizens are often informed and heard observers via public meetings, sometimes in workshop settings. Flood risk management is mostly addressed as a technical issue, to be dealt with by (public) professionals rather than citizens and is focused on prevention (rather than citizen' ability to cope with flooding). At the same time, citizens expect that flood safety is guaranteed by the authorities. According to the perception of the interviewed authorities', floods can come to many citizens as a surprise, because of the relatively low level of awareness of flood risks. The OECD (2014) presented this "awareness gap" as one of the main challenges for future Dutch water governance. This low level of awareness is the result of both, (i) the stance and the ability of the authorities to prevent floods rather well, and (ii) citizens apparently not feeling responsible for flood preparedness themselves. Enserink et al. (2003) observed that there is no tradition of public participation in water management in the Netherlands. The primary role of citizens in decision-making is indirect via elections of the water board but voter turnouts are low, at 20% in 2008.

4.3. Vicenza (Italy)

Vicenza is located in the Veneto Region in Northern Italy and is surrounded by the Beric hills in the South and the Prealpi in the North-West. The Metropolitan area of Vicenza includes both an urban centre, which has exponentially grown in the past century, and peri-urban farmland, for a total population of 113,644. A major flood hit 130 municipalities in the Veneto region in 2010, with one of the most affected municipalities being Vicenza, where 20% of the metropolitan area was flooded.³ The damages in the Province of Vicenza were estimated to amount €6.5 million, arising from more than 11,000 affected inhabitants, 1600 damaged private buildings, 50 km of flooded streets, some 400 businesses and 9 public services.

Italy has history of frequent flooding events with major consequences (Miceli et al., 2008) and a centenary history of hydraulic management legislation. The first integral flood risk management law, however, was emanated in 1989 (183/89 law⁴). The law placed little emphasis on public participation, which became more prominent in subsequent legislation, emanated to comply with the EU Water Framework Directive 2000/60/CE and the Water Framework Directive 2007/60/CE. With the decree 152/2006, the Hydrological District Authorities (Autorità di Distretto Idrografico) were made responsible of organizing and implementing public participation and ensuring transparency, dissemination and accessibility of data to allow all stakeholders to provide comments and observations (art. 66, comma 7). The information and alert system were then delegated to Regions and Civil Protection, a national organization decentralized on the territory, whose mandate is

³ See Bacchiglione River at <http://www.bacchiglione.it/alluvione.php>, accessed on July 2013 and Comune Di Vicenza, Settore Infrastrutture, Gestione Urbana e Protezione Civile at <http://www.comune.vicenza.it/uffici/dipterr/infrastruttureverdepubblico/emergenzaalluvione.php>, accessed July 2013.

⁴ Norme per il riassetto organizzativo e funzionale della difesa del suolo (183/89), integrated with law 253/90 and 493/93.

² i.e. Doncaster Metropolitan Borough Council (DBMC or the Council), the emergency services such as South Yorkshire (SY) police and Fire & Rescue, the Environment Agency (EA) and the public.

to protect human life, goods, settlements and environment from natural disasters. Regions and Civil Protection were also given the responsibility to promote stakeholder participation in designing and refining the basin plans (Decree n. 49/2010, art. 11). Overall, citizen participation in flood risk management is relatively limited. The strategy adopted in Vicenza and its surroundings mainly focuses on mitigation measures, dealing with emergencies, optimizing resources and providing effective and rapid support if and when needed.

5. Potential for citizen participation in flood risk management in Doncaster, Delfland and Vicenza

5.1. Citizen participation during preparation, impact and response

During the preparation, impact and response phases, in all three case studies, citizens are spectators in the interaction with the authorities on flood risk management, with little room for citizen engagement and participation. A strong command and control structure is in place in Doncaster to deal with emergency situations and to draw on necessary resources, if necessary from national government. The communication modes are more limited, with citizens listening as spectators and acting as human sensors by reporting on the local situation. The drainage board described the citizens as the Council’s ‘eyes and ears on the ground’, providing essential information about the local situation in their role as human sensors. Nevertheless, the authority and degree of impact of citizen participation in this phase is limited, mostly concerned with individuals and communities being informed about the current situation rather than having a say in how the situation should be dealt with. Citizens are in charge of decisions concerning their personal safety and the

protection of their property. While DMBC and emergency services such as the police can strongly advise citizens to evacuate and leave their property, the ultimate decision rests with the citizens themselves.

Similarly, in Delfland, there is very limited citizen participation in the preparation and response phases, only the trained volunteers for dyke inspection (the dijkleger; dike army) have a more influential role. The designated mayor coordinates all actions as crisis manager. The water authority provides technical expertise and coordinates the dijkleger and contractors in dyke re-enforcement emergency activities. Specific disaster information communication happens via local radio and television broadcasting. Registered cell-phones can be reached via the ‘NL alert’ service within the specific geographic area to communicate information (www.NLalert.nl). During disasters, communication is currently characterized by its uni-directional flow (also in the authorities’ use of social media). Several interviewees suggested that there is much room for improving communication of the authorities to citizens during emergencies. Currently, citizens are, in the first instance, regarded as possible victims and not as active disaster managers. However, during a crisis, citizens are actually the first on the spot to actively provide help in any way they can, whether the authorities approve of it or not.

The same is true for citizen participation during the preparation, impact and response phases in Vicenza, where citizens as recipients of information seem to act as ‘spectators’ who are provided with emergency procedures (e.g. citywide alarm system, mobility plan, ‘green phone’ emergency number). The local authorities seem to prioritize selected groups of citizens that are viewed as more competent and knowledgeable. These include individuals and organizations that are members of the Protezione Civile who have been trained by the latter on flood management (i.e. trained volunteers) and citizens with specific expertise/professional competencies (i.e. citizen scientists) (Figs. 3–6).

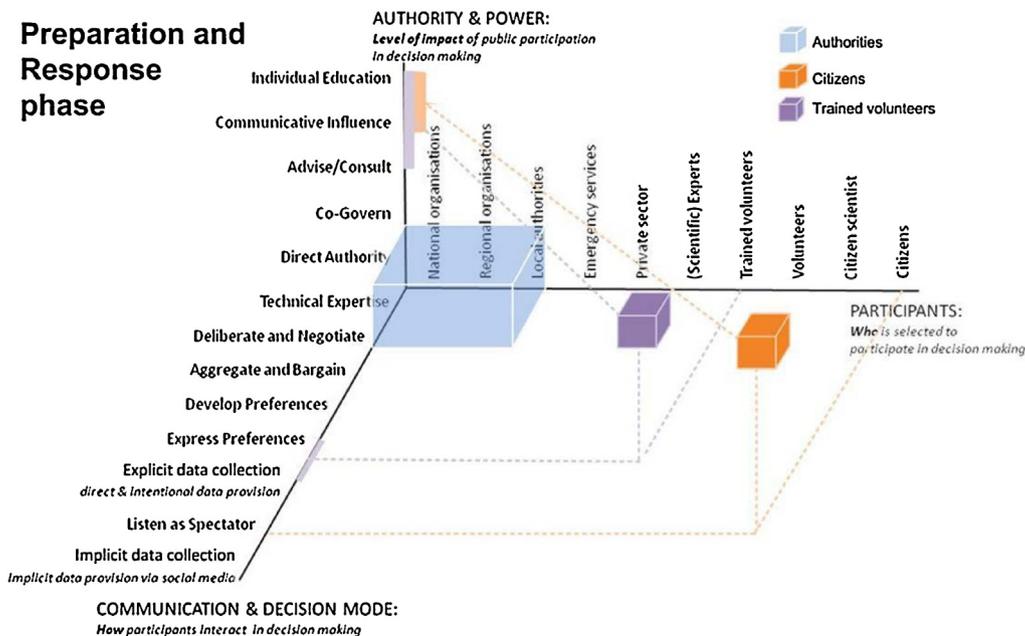


Fig. 3 – Citizen participation during preparation, impact and response in Doncaster (UK).

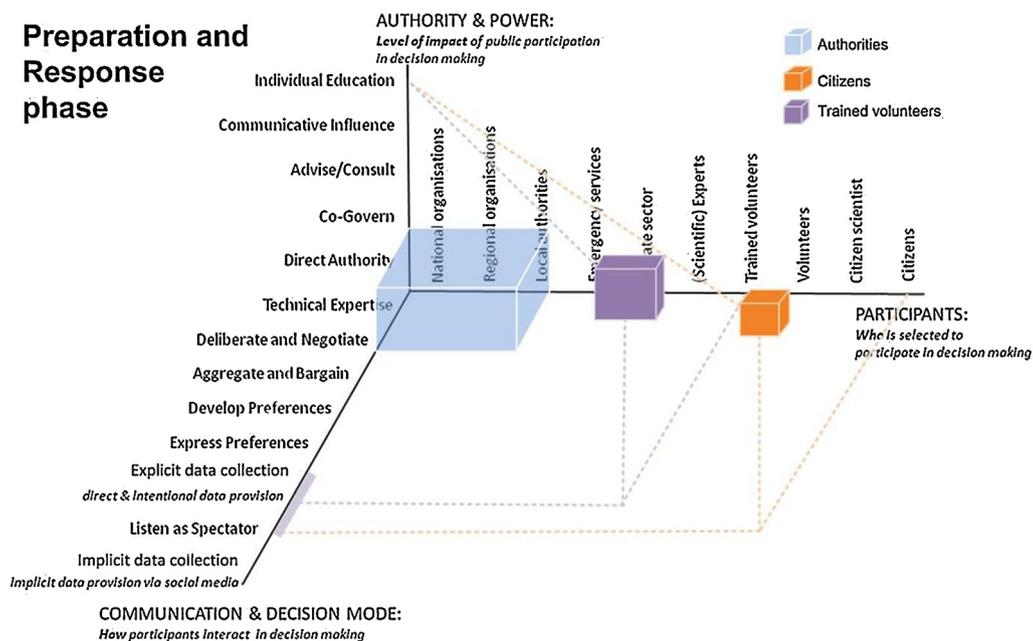


Fig. 4 – Citizen participation during preparation, impact and response in Delfland (NL).

5.2. Citizen participation during recovery and mitigation

During the recovery and mitigation phases, the roles and levels of impact in decision-making by citizens varies across the three cases. In Doncaster, the impact of citizens extends beyond personal education to ‘influential communication’ as well as ‘advising and consulting’, e.g. during the range of community meetings in which South Yorkshire Police, the EA and DMBC seek the communities views and feedback on proposed measures as well as identifying problems and needs

in the local areas. These public meetings are (by now) a prominent two-way communication mechanism for awareness-raising as well as gathering information and feedback from flood-affected or at-risk communities about flood risk management and necessary actions, with the overall goal of building trust in the agencies’ approach to flood risk management. It is important to note that it took a while to establish these meetings with a critical mass of citizens attending. DMBC is also proactively approaching the communities via the Parish councils and flood wardens to identify

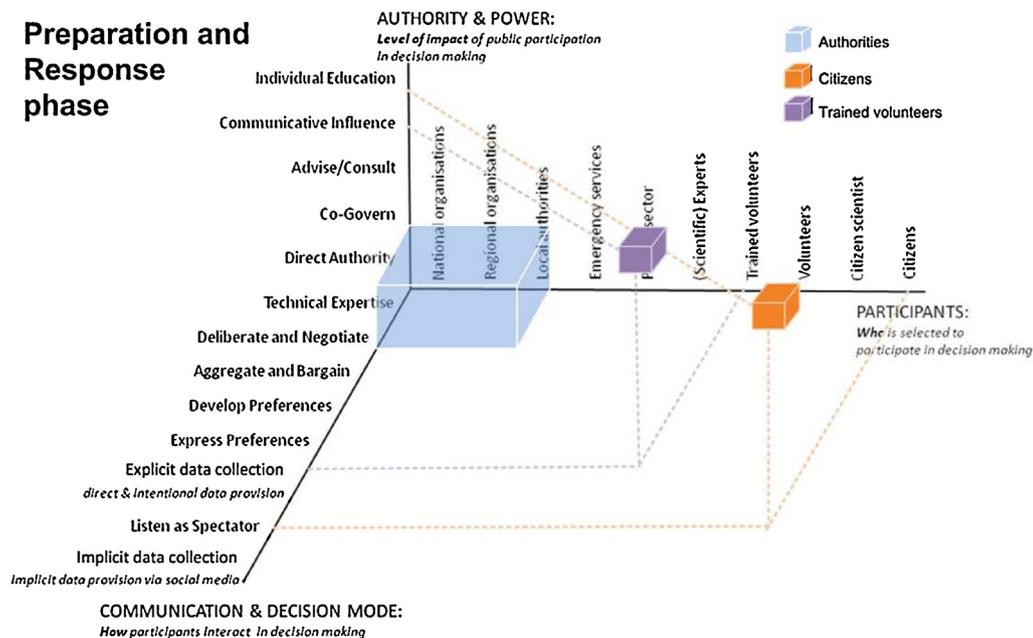


Fig. 5 – Citizen participation during preparation, impact and response in Vicenza (IT).

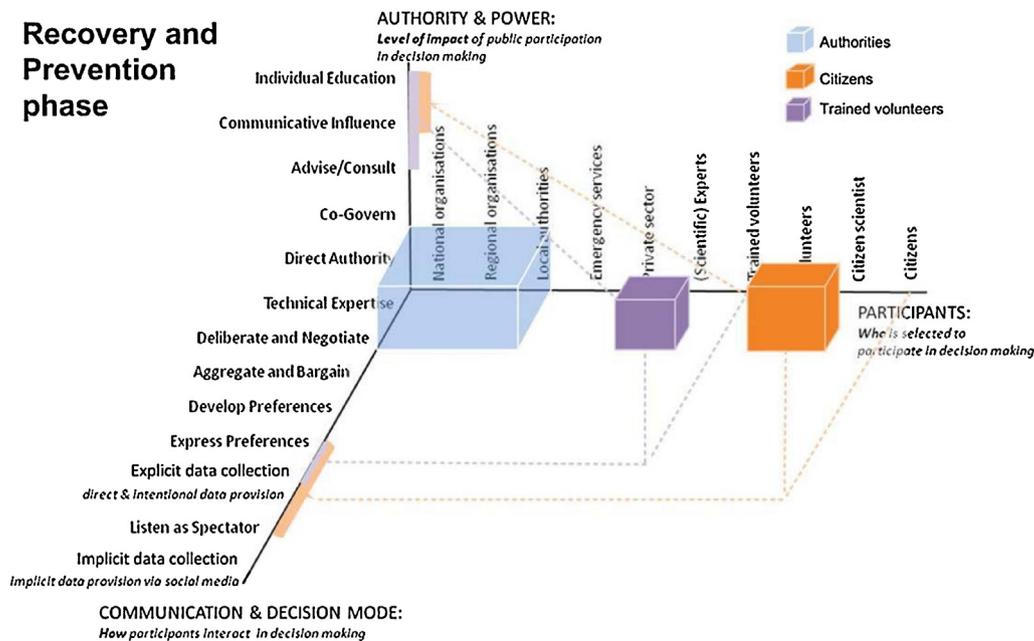


Fig. 6 – Citizen participation during recovery and mitigation in Doncaster (UK).

their biggest worries or perceived risks. Furthermore, they also talk to ‘angry’ groups who are thus both empowered and included in the process. During the recovery phase of a flood, public meetings and drop in days are organized at the Council. These meetings present an opportunity to express and develop the citizens’ preferences. The authorities and emergency services all seem to consider the communities and citizens valuable providers of information and insights. Community representatives such as flood wardens and citizens elected as councillors are involved in, and attend, regional committees (e.g. the DMBC Multi-Agency Flood Forum) and as such have the means to have an impact in decision-making by influencing agenda setting. Moreover, elected councillors have the authority to approve policy documents related to flood risk management (e.g. the Preliminary Flood Risk Assessment in 2011 (DBMC, 2011)).

In the densely built-up Delfland area, several projects focus on giving space to water to prevent flooding in other areas. Stakeholders are more and more involved in these planning and decision-making processes, although final decisions are exclusively made by the water board and municipal council. Communication is traditionally unilateral, but via workshops and consultation sessions, stakeholders and citizens are involved for information, advice, or consultation. The level of engagement is, however, not institutionalized (like knowledge sharing, consulting, advising, co-development), still depending on the context of each project (team leader, time and resources). In the case of spatial/flood risk management projects, citizens are engaged in knowledge provision and consultation. Individual stakeholders are able to block or slow down the implementation of flood risk projects by not cooperating (e.g. by not selling property as required by a particular infrastructural project). As such, their influence is greater than during the planning and decision-making phases about flood risk schemes (see also illustration in Fig. 7).

While key local government organizations in Vicenza seem to agree on the potential of citizen participation in flood risk management, in practice the role attributed to citizens is quite marginal and instrumental to assisting (e.g. providing information) and supporting local government bodies involved in flood risk management (e.g. implementing and complying with legislation). Citizens are mainly regarded (but not always ‘used’) as providers and recipients of information. As a source of information, their role is mainly envisioned during the mitigation phase or day-to-day management, when citizens are encouraged to collect and disseminate data. Participation as envisioned by the local authorities is mainly focused on information exchange (to and from the citizens), while involvement in decision-making processes seems latent. Moreover, citizen participation is selectively implemented: the most prominent strategy of citizen participation in flood risk management seems to be more geared towards the establishment of a network of qualified observers, rather than towards a broader involvement of citizens’ groups. The involvement of expert citizens and trained volunteers takes place mainly via the volunteer component of ‘Protezione Civile’. The ‘common’ citizens are seen as a recipient of information, a spectator who has to execute tasks and practices designed by local authorities, rather than an active participant (see illustration in Fig. 8).

5.3. Drivers and barriers for citizen participation

De jure (on paper), formal institutions, such as the Flood Risk Directive, the EU Water Framework Directive and the Aarhus Convention require citizen participation (in flood risk management), but, *de facto* (in practice), the importance given to these and the extent of their implementation varies in the three cases. Our analysis of their transposition in the previous sections has shown that implementation is limited when

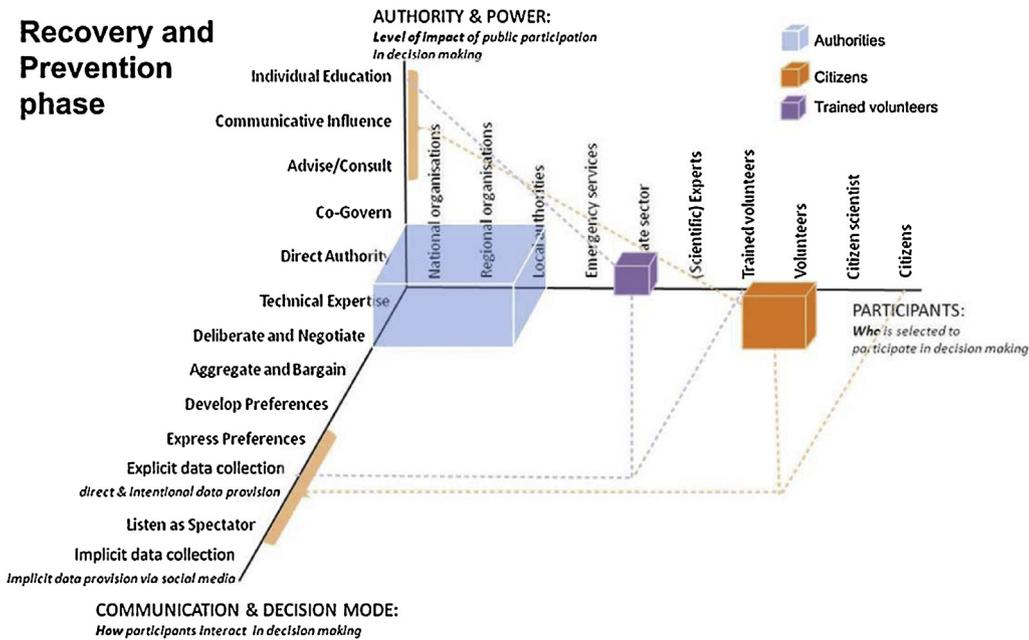


Fig. 7 – Citizen participation during recovery and mitigation in Delfland (NL).

examining in detail (a) the respective roles and types of interactions between citizen and authorities and (b) the impact of citizen participation on decision-making throughout the different phases of disaster cycle. Aside from these institutional obligations for citizen participation, e.g. having to demonstrate ‘fit for purpose participation’ in planning activities, here we explore other factors that can be identified as drivers or barriers, respectively strengthening or hindering citizen participation.

The first consists of the authorities’ perception of citizen participation and the extent to which authorities expect or

have experienced valuable outcomes from citizen participation during the different flood risk phases. In the Doncaster (UK) case, the benefits of participation are perceived to consist of much improved insights into the needs of at-risk communities by the local authorities and the emergencies services, gained during regular face-to-face meetings with communities. Moreover, changes in the funding structure now require various stakeholders to collaborate (EA, local authorities, communities) and present a shift in citizen participation to the start – rather than the end – of the planning process, resulting in a changed sequence of steps during flood risk interventions,

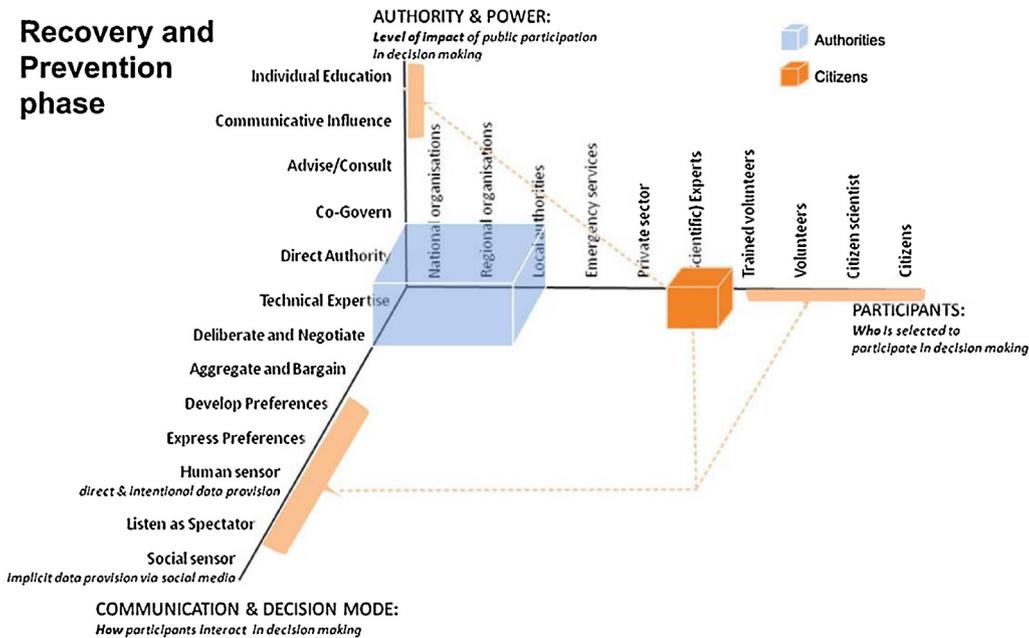


Fig. 8 – Citizen participation during recovery and mitigation in Vicenza (IT).

from ‘design-defend-implement’ to ‘discuss-design-implement’. This presents a shift of the interactions with citizens to the start of the planning process, avoiding confrontation with communities just before project implementation. This goes hand in hand with the desire of the (local) authorities to change the mind set and the role of citizens (from being a customer ‘receiving services’ to taking responsibility in flood risk management and other areas of public policy including. These findings are consistent with [Nye et al. \(2011\)](#) regarding the emphasis on community engagement and responsibility for flood risk planning in the UK. In the Delfland (NL) case, less emphasis is placed on citizens’ local needs and knowledge, with a more passive role for citizens who will simply be informed and consulted about plans and decisions in flood prevention projects, much like the previous ‘design-defend-implement’ approach in the UK. Similarly, in the Italian case (Vicenza), only ‘selective’ citizen participation takes place or is foreseen (e.g. by citizen scientists) and most citizens are considered ‘obedient’ implementers of established practices.

Secondly, the citizens’ interest in participating in flood risk management, as perceived by the authorities in all three cases, seems to stem from the citizens’ perception of flood risk: the lower the citizens perceive flood risks, the more limited their interest in participation. Yet the authorities’ responses to low levels of flood risk perception are different: in the Doncaster case, considerable efforts are being made by the local authorities (with limited response and success) to reach broader segments of the population than flood wardens (typically pensioners) and school children. In the Delfland case, the perceived ‘awareness gap’ among citizens and a resulting lack of trust in community resilience during the impact phase go hand in hand with a paternalistic governance style of the authorities, focusing on prevention of floods altogether rather than preparation, jointly with citizens. Similarly, in the Vicenza case, the authorities perceive low flood risk awareness of citizens stemming from, and justifying, a focus on infrastructural measures. The low flood risk perceptions also reflect the sporadic nature and the spatially uneven impact of flood events. For instance, most of the damages occur in areas along the river in Vicenza, while large parts of the city centre are only marginally affected. The commitment to participate seems to be directly correlated with the degree of impacts that citizens suffer from the flood events, thus leading to a differential participation based on geographic and situational factors. In both, the Dutch and the Italian cases, low flood risk awareness among citizens seems to act as a barrier for participation.

Thirdly, as we argued at the outset, ICTs in general, and their innovative combination in citizen observatories in particular, can present new opportunities for citizen participation. As indicated above and analyzed in more detail elsewhere ([Wehn and Evers, 2014](#)), the examined case studies do not yet present strong ICT-enabled participation (eParticipation). Nevertheless, the local patterns of participation that have emerged from this governance analysis suggest that the citizen observatories are likely to take specific ‘shapes and sizes’ in the three locations. Different perceptions of the role of citizens, combined with the different strategies adopted by the three countries in response to the EU directives seem to call for different set ups of citizen observatories. For the authorities, it

seems important to clearly define the role of citizens for the different stages of the decision-making process and for the different stages of the disaster cycle, as well as to provide feedback on how the provided data, information and insights collected via the citizen observatories were used in the decision-making processes. In situations of lacking institutionalized public participation, as in the Delfland case where participation is done ad hoc (depending on the project context), a citizen observatory may present an opportunity for local authorities and citizens to develop more regular and fitting means of citizen participation. In other contexts, such as the UK case with its reliance on regular and intense face-to-face contact with (mostly older and less technology-savvy) members of the communities, a citizen observatory may help to bridge the (largely generational) participation gap by involving previously unengaged segments of the communities such as the Digital Natives and their parents. In any event, care needs to be taken that citizen observatories indeed help to create inclusive – rather than exclusive – participatory processes.

6. Conclusions

In this paper, we have focused on the transposition of the European Flood Directive and the drivers for increased citizen participation in flood risk management, providing a comparative analysis of governance structures, institutions and mechanisms, based on empirical research in the UK, the Netherlands and Italy. Our analysis of the transposition of legal obligations for citizen participation shows that implementation is limited when examining in detail the respective roles and types of interactions between citizen and authorities, and the impact of citizen participation on decision-making. Different authorities have differing perceptions of citizen participation in flood risk management in terms of their roles and influence. We therefore conclude that although legal obligations for citizen participation in flood management exist, local patterns of participation seem to prevail. The variety in public participation approaches in these cases may also be due to the lack of a clear framework for, and conceptualization of, public or stakeholder participation in the [EU white paper on governance \(2001\)](#) and the EU directives ([Magnette, 2003](#)). However, our results also indicate that these perceptions are related to the emphasis that the authorities place on the different stages of the disaster cycle: a strong focus on prevention/mitigation in the Delfland and Vicenza cases, while in the Doncaster case, more emphasis is being placed on preparedness and response. We contend that, in relative terms, current participation approaches in the three cases present citizens with somewhat stronger impact on decision-making and a slightly broader spectrum of possible interactions during the recovery and mitigation phases than during the preparation, impact and response phases. Yet it is during recovery and mitigation that the authorities experience citizen awareness of flood risks at its lowest level. This is where citizen observatories enabled by ICTs can play a role, potentially triggering interest, raising awareness among citizens and providing an ‘entry point’ to greater citizen participation via their engagement in explicit data collection. However, given the differing perceptions by the authorities,

this also seem to call for different ‘shapes and sizes’ of citizen observatories.

Our governance analysis has focused on the perceptions of the involved authorities and has shown that the observed (limited) levels of citizen participation in these cases do not necessarily imply that greater involvement in decision-making is not being sought or even being prevented by policy makers and local authorities. Rather, not all citizens may be in a position to, or interested in, participating in flood risk management. Future research should therefore systematically investigate the motivations of and (dis)incentives for citizens to participate in flood risk management in order to confirm the authorities’ claims in terms of ‘awareness gaps’, ‘flood risk fatigue’ during the prevention phase and ‘customer service’ attitudes of citizens and to indicate how citizen observatories may help to address these in the interest of participation for improved flood risk management. To this end, the “Citizen participation via ICT-enabled observatories Framework” could be enriched by adding a quantitative measure of the incentives for active participation in flood risk management by the population at risk.

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REFERENCES

- Alexander, D., 2002. *Principles of Emergency Planning and Management*. Terra Publisher, Harpenden.
- Arnstein, S., 1969. A ladder of citizen participation. *J. Am. Plan. Assoc.* 35 (4) 216–224.
- Behagel, J., Turnhout, E., 2011. Democratic legitimacy in the implementation of the water framework directive in the Netherlands: towards participatory and deliberative norms? *J. Environ. Policy Plan.* 13 (3) 297–316.
- Bradford, R.A., O’Sullivan, J.J., van der Craats, I.M., Krywkow, J., Rotko, P., Aaltonen, J., Bonaiuto, M., De Dominicis, S., Waylen, K., Schelfaut, K., 2012. Risk perception – issues for flood management in Europe. *Nat. Hazards Earth Syst. Sci.* 12 (7) 2299–2309.
- Ciravegna, F., Huwald, H., Lanfranchi, V., Wehn de Montalvo, U., 2013. In: *Citizen Observatories: The WeSenseIt vision, INSPIRE 2013 (Infrastructure for Spatial Information in the European Community)*, Florence, Italy, 23–27 June.
- Defra, 2009a. *The Flood Risk Regulations*. Department for the Environment, Food and Rural Affairs, UK.
- Defra, 2009b. *The Flood Risk Regulations (Explanatory Notes)*. Department for the Environment, Food and Rural Affairs, UK.
- Defra, 2010. *Flood Water Management Act United Kingdom*. Department for the Environment, Food and Rural Affairs, UK.
- DMBC, . Preliminary Flood Risk Assessment Doncaster Metropolitan Borough Council. www.donstaster.gov.uk.
- EA, 2011. *National Flood and Coastal Erosion Risk Management Strategy for England*. Environment Agency, UK.
- Edelenbos, J., Klijn, E.H., 2006. Managing stakeholder involvement in decision-making: a comparative analysis of six interactive processes in the Netherlands. *J. Public Adm. Res. Theory* 16 (3) 417–446.
- Enserink, B., Kamps, D., Mostert, E., 2003. *Public Participation River Basin Management in The Netherlands. (Not) Everybody’s Concern*. RBA-Centre, Delft University of Technology, Delft, 51.
- European Commission, 2001. *European Governance: A White Paper*, vol. 54. COM, pp. 428.
- European Environment Agency, 2010. *Mapping the Impacts of Natural Hazards and Technological Accidents in Europe – An Overview of the Last Decade*, EEA Technical Report 13/2010. .
- Fung, A., 2006. Varieties of participation in complex governance. *Public Adm. Rev.* 66, 66–75.
- Hill, C., Lynn, L., 2005. Is hierarchical governance in decline? Evidence from empirical research. *J. Public Adm. Res. Theory* 15 (2) 173–195.
- Holden, M., 2006. Urban indicators and the integrative ideals of cities. *Cities* 23 (3) 170–183.
- Lanfranchi, V., Wrigley, S., Ireson, N., Ciravegna, F., Wehn, U., 2014. Citizens’ observatories for situation awareness in flooding. In: Hiltz, S.R., Pfaff, M.S., Plotnick, L., Shih, P.C. (Eds.), *Proceedings of the 11th International ISCRAM Conference (Information Systems for Crisis and Response Management)*978-0-692-21194-6.
- Lautze, J., de Silva, S., Giordano, M., Sanford, L., 2011. Putting the cart before the horse: water governance and IWRM. *Nat. Resour. Forum* 35 (1) 1–8.
- Magnette, P., 2003. European governance and civic participation: beyond elitist citizenship? *Polit. Stud.* 51 (1) 144–160.
- Miceli, R., Sotgiu, I., Settanni, M., 2008. Disaster preparedness and perception of flood risk: a study in an alpine valley in Italy. *J. Environ. Psychol.* 28 (2) 164–173.
- MIE and MEAAI (Ministry of Infrastructure and the Environment and Ministry of Economic Affairs, Agriculture and Innovation, 2011. *Delta Programme in the Netherlands*. MIE and MEAAI, The Hague.
- NBDC, 1998. *Honderden miljoenen schade na regenramp*[n]Hundreds of Millions Damage After Disastrous Rainfall. Nationaal Brandweer Documentatie Centrum, Haarlem.
- NBW (Nationaal Bestuursakkoord Water), . *Het Nationaal Bestuursakkoord Water*[n]National Administrative Agreement on Water Affairs. www.rijksoverheid.nl.
- Nye, M., Tapsell, S., Twigger-Ross, C., 2011. New social directions in UK flood risk management: moving towards flood risk citizenship? *J. Flood Risk Manag.* 4 (4) 288–297.
- OECD, 2011. *Water Governance in OECD Countries: A Multi-level Approach*. OECD Publishing, Paris.
- OECD, 2014. *Water Governance in the Netherlands*. OECD Publishing, Paris.
- Pahl-Wostl, C., 2009. A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Glob. Environ. Chang.* 19 (3) 354–365.
- Pahl-Wostl, C., Holtz, G., et al., 2010. Analyzing complex water governance regimes: the management and transition framework. *Environ. Sci. Policy* 13 (7) 571–581.
- Pitt, M., 2008. *The Pitt Review: Lessons Learned from the 2007 Floods*. Cabinet Office, London.
- Reed, M.S., 2008. Stakeholder participation for environmental management: a literature review. *Biol. Conserv.* 141 (10) 2417–2431.
- Rijke, J., Brown, R., Zevenbergen, C., Ashley, R., Farrelly, M., Morison, P., van Herk, S., 2012. Fit-for-purpose governance: a

- framework to make adaptive governance operational. *Environ. Sci. Policy* 22, 73–84.
- Rojas-Caldenas, R.I., Corona Zambrano, E.A., 2008. Urban observatories opportunities for environmental monitoring: solid wastes. *Waste Manag.* 28, 40–44.
- Saravanan, V.S., 2008. A systems approach to unravel complex water management institutions. *Ecol. Complex.* 5 (3) 202–215.
- Slomp, R., 2012. Flood Risk and Water Management in the Netherlands. A 2012 update. The Hague, Rijkswaterstaat.
- Swyngedouw, E., 2005. Dispossessing H₂O: the contested terrain of water privatization. *Capital. Nat. Soc.* 16 (1) 81–98.
- Tritter, J.Q., McCallum, A., 2006. The snakes and ladders of user involvement: moving beyond Arnstein. *Health Policy* 76 (2) 156–168.
- UNECE, 1999. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, 2161 UNTS 447; 38 ILM 517. United Nations Economic Commission for Europe, Aarhus.
- Wehn, U., Evers, J., 2014. In: Citizen Observatories of Water: Social Innovation via eParticipation? Presentation at ICT4S (ICT for Sustainability). Stockholm, Sweden, 24–27 August.
- White, I., Kingston, R., Barker, A., 2010. Participatory geographic information systems and public engagement within flood risk management. *J. Flood Risk Manag.* 3 (4) 337–346.
- White, W.R., 2000. *Water in Rivers: Flooding. A Contribution to the Worldwater Vision*. IAHR, UK.
- Yamada, F., Kakimoto, R., Yamamoto, M., Fujimi, T., Tanaka, N., 2010. Implementation of community flood risk communication in Kumamoto, Japan. *J. Adv. Transp.* 45 (2) 117–128.