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Citizen involvement in water issues: an exploration of case studies around the world

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BTO Managementsamenvatting

Succesvolle voorbeelden van burgerbetrokkenheid in buitenland bieden Nederlandse watersector inspiratie voor eigen aanpak

Auteur(s) Drs. Chris Büscher, Timo Maas, BA, Dr. Stijn Brouwer en ir. Jos Frijns

Een studie waarin acht internationale cases van burgerbetrokkenheid met elkaar zijn vergeleken biedt de Nederlandse watersector niet slechts stof tot lering, maar met name inspiratie voor de wijze waarop burgerparticipatie in de praktijk van ons waterbeheer kan worden vormgegeven en opgezet. Dit blijkt uit een studie die aan de hand van voorbeelden uit Europa, de Verenigde Staten, Azië en Australië, inzicht geeft in de waarde en betekenis van verschillende vormen van burgerbetrokkenheid. Wereldwijd herkent en omarmt men in toenemende mate de innovatie- en denkracht van burgers. Verbindingen met burgers komen tot stand via traditionele vormen van participatie, gericht op het delen van invloed, maar ook via nieuwe manieren waarbij het vergaren, co-creëren en delen van kennis centraal staat: 'citizen science'. In de Nederlandse watersector staat deze nieuwe vorm van kennisproductie en burgerbetrokkenheid nog in de kinderschoenen. De kennis en inzichten voortkomend uit deze studie beogen de zoektocht naar het leggen van de verbinding met burgers te vergemakkelijken.



Burgerwetenschappers krijgen uitleg over het nemen van monsters bij de Mississippi River

Belang: internationale ervaringen zijn een bron van lering en inspiratie voor burgerbetrokkenheid

Steeds vaker en overal ter wereld doen bedrijven, overheden en kennisinstituten een beroep de creatieve, innovatie en denkracht van burgers. Naast traditionele participatievormen krijgt deze verbinding in toenemende mate vorm door het betrekken van burgers bij het vergaren, co-creëren en delen van kennis: *citizen science*. Dankzij een sterkere verbondenheid met burgers kunnen alternatieve, meer gedragen, en mogelijk ook betere beleidsoplossingen,

ideeën en zelfs producten ontstaan. Ook de Nederlandse drinkwatersector zoekt die verbinding met de burger steeds nadrukkelijker op. Alleen is het voor veel betrokkenen nog geen uitgemaakte zaak hoe deze ambitie het beste kan worden ingevuld. Kennis en inspiratie van succesvolle voorbeelden uit het buitenland bieden handvatten en inzichten om die zoektocht te vergemakkelijken.

Aanpak: analyse van acht internationale casussen van burgerbetrokkenheid in het waterbeheer

In het Verkennend Onderzoek i-Water is naast een eerdere conceptuele en methodologische verkenning nu ook een internationale analyse gemaakt van manieren waarop waterorganisaties wereldwijd de binding met burgers trachten vorm te geven. Voor een zo groot mogelijke verscheidenheid in inspiratie is gekozen voor casussen die niet alleen verschillen in geografische ligging, maar met name uiteenlopen in inhoudelijke reikwijdte en diversiteit. In totaal gaat het om acht verschillende casussen: twee in de Verenigde Staten, twee in Europa, twee in Azië, en twee in Australië. Zo nemen we in de VS een citizen science project onder de loep dat is gerelateerd aan schaliegasboringen in Pennsylvania, analyseren we de sterke toename van burgerbetrokkenheid in Parijs na terugkeer van de drinkwatervoorziening in publieke handen, en onderzoeken we de invloed van burgers op het waterbedrijf in Melbourne (Australië). Hoewel deze cases niet uitputtend zijn, geven ze wel een goed beeld van de veelzijdige manier waarop de watersector wereldwijd burgers bij haar werkzaamheden probeert te betrekken. In de analyse is gebruik gemaakt van zowel academische als grijze literatuur, van het Internet, en van persoonlijke communicatie met sleutelbetrokkenen, inclusief professionals en academici.

Resultaten: inzicht in verschillende vormen en kansen van het betrekken van burgers in de watersector

Deze internationale analyse laat zien hoe op vele plekken ter wereld organisaties in de watersector verbindingen aangaan met burgers, bijvoorbeeld door middel van citizen science. Tot op heden is, zeker in de drinkwatersector, het aantal projecten op dit gebied schaars en veelal geconcentreerd op oppervlaktewaterkwaliteitsmetingen in de VS. Andere manieren van burgerbetrokkenheid die in deze studie naar voren komen berusten onder meer op het delen van data, het consulteren met burgers, of het - al dan niet structureel - overdragen van beslissingsmacht aan burgers. Hoewel iedere vorm van burgerbetrokkenheid binnen zijn eigen unieke context specifieke voor- en nadelen kent valt op dat de mate van feitelijke betrokkenheid en verbinding sterk varieert en zeker bij de traditionele vormen van participatie sterk samenhangt met de feitelijke invloed die aan burgers wordt gegeven.

Implementatie: van inspirerende voorbeelden naar het toepassen van citizen science in de praktijk

De verbinding die de Nederlandse watersector met burgers zoekt staat niet op zichzelf, maar past binnen een wereldwijde ontwikkeling waarin burgers in toenemende mate en op veel terreinen participeren in en betrokken worden bij de vormgeving en implementatie van waterbeleid. Een van de manieren waarop dit kan worden vormgegeven is burgers te betrekken bij het vergaren van kennis, in plaats van hen te laten delen in de beslissingsmacht; een meer 'traditionele' participatievorm. Mede op basis van de inzichten en inspiratie die hieruit volgen wordt binnen het VO iWater in samenwerking met Waternet een citizen science pilot opgezet. Doel hiervan is om ook binnen de Nederlandse context van de watersector empirische data te verzamelen om burgerbetrokkenheid bij onderzoek goed op waarde te kunnen schatten.

Rapport

Dit onderzoek is beschreven in rapport *Citizen involvement in water issues: an exploration of case studies around the world* (BTO-2016.046)

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1 Introduction

This report explores how and to what extent citizens are involved in the generation of knowledge and innovation, as well as policy and decision-making processes of water organisations around the world. The report is part of a larger study called iWater, which focuses on citizen science related to drinking water. Citizen science is defined as “...any form of active public participation in the process of research to generate science-based knowledge, from setting the research agenda by asking research questions, to collecting data, and/or analysing the results” (Brouwer & Maas, 2015: 11). This report includes, but is not limited to citizen science cases, nor focused only on drinking water. The aim is to draw lessons and inspiration from a variety of cases around the world, in which citizens engage with water issues and/or the drinking water company in their (mostly urban) neighbourhoods.

The report discusses eight cases: two in the United States, Europe, Asia and Australia respectively. They range from water citizen science projects related to shale gas explorations in Pennsylvania (USA), and increased citizen involvement in Paris’s water management after water remunicipalisation, to the Price Submission Process by Melbourne Water in Australia, whereby citizens are consulted on different water-related themes. These cases reveal the diversity in participation types aimed at connecting citizens and water companies, but of course the list is not exhaustive; there are other types to be found.

1.1 Analytical framework: the ladder of participation

Two frameworks proposed and discussed in D2.1 of iWater (Brouwer & Maas, 2016) are used for analysing the cases. The framework outlined in table 1, based on Shirk et al. (2012), is specifically focused on citizen science. It provides an overview of the different types of citizen science projects, highlighting the involvement of the public in the various research steps. Within the table, the letter ‘P’ indicates that the public participates in this step of the research process, (P) that the public may participate, whereas the letter ‘I’ indicates that the public executes this step independently.

TABLE 1: TYPOLOGY AND DESCRIPTION OF (THE INVOLVEMENT OF THE PUBLIC IN) CITIZEN SCIENCE PROJECTS (BASED ON SHIRK ET AL. 2012).

Type of project	Contractual	Contributory	Collaborative	Co-created	Collegial
Role of citizens	<i>Pose research questions to the scientific community</i>	<i>Contribute samples or data to a research project</i>	<i>Collect data and analyse results together with scientists</i>	<i>Work together with scientists to develop and execute a research project</i>	<i>Independently set-up and execute a research project</i>
Choose/define research question	I/P			P	I
Develop hypotheses				P	I
Design methods for data collection			(P)	P	I
Data collection		I/P	P	P	I
Data analysis		(P)	P	P	I
Interpret data & draw conclusions	(P)		(P)	P	I
Dissemination & Implementation	(P)		(P)	P	I
Evaluation	P			P	I

But given the broader scope in this report, not focused only on citizen science but indeed on other participation types between citizens and water organisations, we additionally make use of the Ladder of Participation developed by Arnstein (1969). The ladder is described in D2.1 of iWater as follows (Brouwer & Maas, 2016).

Rather than assuming that stakeholder participation is or it not present in decision-making, Arnstein (1969) distinguishes between different forms, or degrees, of participation. These are depicted in Figure 1. This ladder, which despite being published some 45 years ago is still the most prominent characterisation of the different forms of participation, identifies eight different degrees of participation. The degrees vary from low level involvement at the lowest rung, described as *manipulation*, to the slightly higher rung of *therapy*, which Arnstein defines as essentially symbolic efforts or types of “non-participation” in which the public is “educated” or “cured”. The next rung, *informing*, provides stakeholders with knowledge, yet the flow of information is usually one-way. The *consulting* rung aims to involve the opinions of stakeholders, but gives no guarantee that their input will actually be taken into consideration. In the *placation* case, this is somewhat less of a problem, for instance through including community representatives on decision-making boards, but the project’s initiators may still have exclusive decision-making power through a larger number of votes or the right to ignore given advice. At the *partnership* level, stakeholders are given a more direct influence on the content of a project: rules regarding participation are laid down and may thereafter not be changed without consensus across actors. Only the highest two

levels, *delegated power* and *citizen control*, would award stakeholders real power. The differences between the different degrees of participation depend on what kind of information is given to stakeholders, what kind of options they get to voice their opinion, and most important, what kind of power they get to actually influence decision-making (Arnstein 1969).

FIGURE 1: LADDER OF PARTICIPATION BY ARNSTEIN (1969)



Like all conceptual frameworks, this ladder has been subject to critique, notably on its implicit assumption that control and (extensive) involvement of citizens is always considered better. Some have argued, moreover, that the question who to include, and to what degree citizens should be involved in decision-making, is inherently dependent on context. Others have questioned the static view of the public underpinning the ladder, and the disregard of changes that occur in people's values and therefore behaviour through experiences they undergo. Notwithstanding such critique, the ladder is still considered amongst the most influential conceptualisations of public participation in decision-making practices (Brouwer & Maas, 2016: 44-45). The ladder is also suitable for interpreting several of the different types of participation in the cases explored in this report. We will therefore come back to it in chapter three.

1.2 Methodology

The research for this report involved three steps. The first was an Internet search for suitable cases. Initially, the focus was on citizen science cases related to drinking water around the world. A first search, however, revealed little diversity in types of water citizen science projects as well as in the geographical dispersion of cases. That is, the citizen science cases found were mainly focused on monitoring water ways by citizens living near to these waters, and these cases were mostly situated in North America. We therefore broadened our scope,

looking for a diversity of ways in which citizens are involved in dealing with water issues in their region/city, and in different continents. This resulted in the selection of cases discussed in this report. As said, this selection is neither (meant to be) exhaustive, nor representative of all forms of citizen participation in water-related issues found in the world. However, the set of cases does provide an excellent illustration of this diversity and inspires the reader about the different ways in which citizens can be, and are, involved in water issues.

Once the cases were selected, the second step involved the actual gathering of data. Data was gathered through literature search in journals and on the Internet, and academic and grey literature was found on all cases. Additional and more in-depth information was sought through personal communication with professionals involved and/or academics knowledgeable on the cases. This had mixed success; some respondents responded quickly to queries and were willing to share information on the topic, whilst others could not or hardly be reached. Thus, although for each case actors were approached, we did not in all cases received a response, and in some cases where we did get one, the responses revealed little new information. The following table summarises these efforts.

TABLE 1: DATA GATHERING EFFORTS THROUGH PERSONAL COMMUNICATION

Cases		Personal communication
USA	Shale gas & water citizen science in Pennsylvania	Phone call with Kirk Jalbert , researcher FracTracker Alliance
	Tucson, Arizona	E-mail correspondence with Kris LaFleur & Johanna Hernandez of Tucson Water
Europe	Eau de Paris	Several mails sent to different departments, no response
	Scotland Water	Several mails sent to different departments, no response
Australia	Melbourne Water	E-mail contact with the Communication and Engagement team, no follow-up response
	Yarra Valley Water	E-mail correspondence with Tarnya McKenzie, Marketing manager
Asia	Singapore	E-mail correspondence with Azhar Shukor and Lester Lim from Singapore's water company PUB
	Seoul	Several mails sent to different departments, no response

The third step involved the analysis of data, using Arnstein's Ladder described in the previous section.

1.3 Structure of report

The next chapter provides descriptions of the cases in the USA, Europe, Australia and Asia respectively. Chapter three links these cases to the framework of Arnstein and the fourth and last chapter concludes.

2 Citizen involvement in water issues: a description of case studies around the world

This chapter presents a selection of cases in the United States, Europe, Australia and Asia respectively, describing how citizens engage with water issues and/or the water utility in their city or region. This chapter merely provides descriptions of these cases; the next chapter will further interpret the types of engagements, using the conceptual model presented in the introduction.

2.1 United States

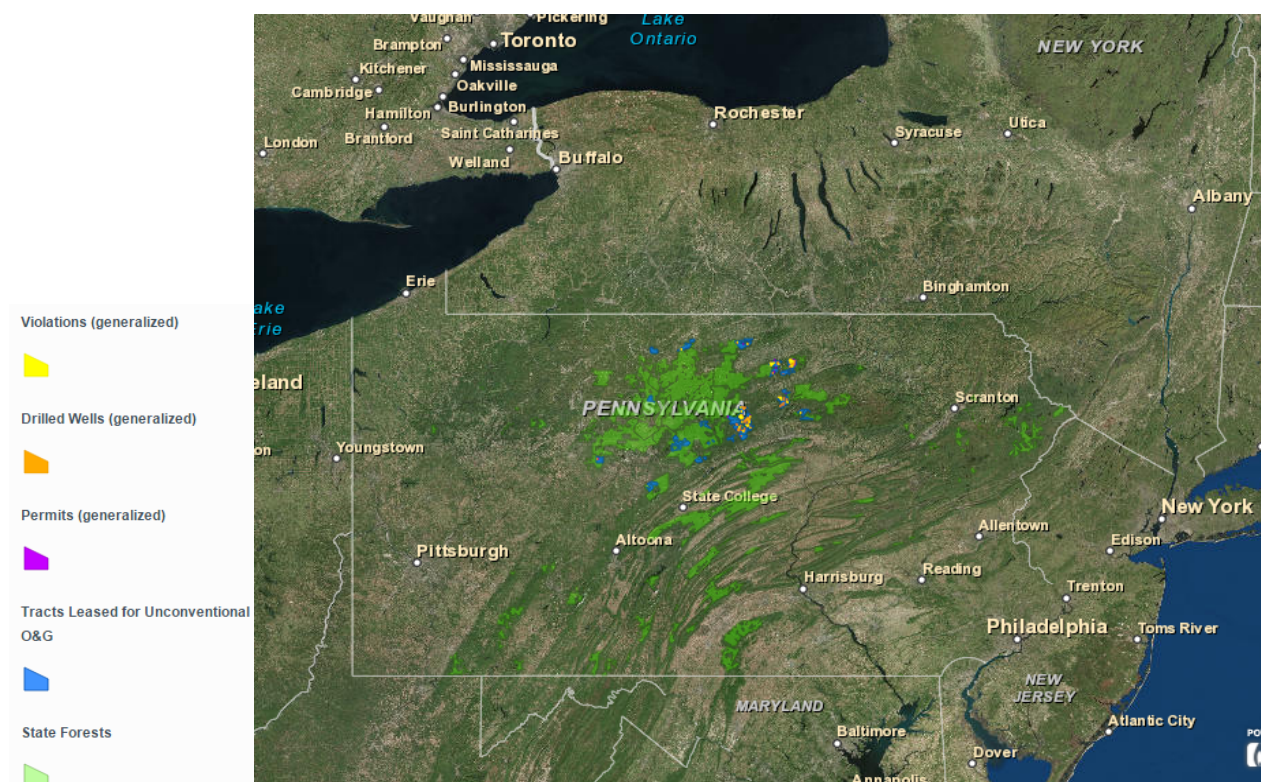
Two types of citizen engagement in water issues are explored in the United States. The first one involves water citizen science in the state of Pennsylvania, in which water quality is monitored in areas where shale gas explorations are taking place. The second is the Citizens' Water Advisory Committee in Tucson, Arizona. This committee advises the city's water utility on a variety of water management issues in and around the city of Tucson. Although the case studies differ in content, both represent a development or institution that can be found elsewhere in the USA. Shale gas explorations are carried out in many states across the USA, and similar water issues related to shale gas explorations are being investigated by community groups like the ones in Pennsylvania. And, as in Tucson, cities across the country have institutionalised community feedback mechanisms through a formal committee or otherwise.

2.1.1 Water citizen science related to shale gas operations in Pennsylvania

The recent boom in shale gas exploration and drilling in the United States has given rise to public concerns on contamination of water by the chemicals used in this process (Vidic et al. 2013). This was also the case with citizens in the state of Pennsylvania. Between 2004 and 2013, oil and gas companies rapidly expanded their shale gas operations in Pennsylvania, especially in the Marcellus Shale (see map in figure 2), with more than 7000 unconventional gas wells drilled in this period. At the same time, funds within government agencies for monitoring the quality of water sources had shrank considerably. After major pollution incidents, uncertainty and fear of citizens about the impact of shale gas operations on their waters increased, and citizens went searching for information to challenge the industry's and government's activities and one-sided arguments and explanations. Few reliable information sources were found, however, and this triggered citizens to become involved in citizen-science initiatives (Jalbert, 2015).

Since then, many citizen-science initiatives have been set up and developed, and these can broadly be categorized as follows (Jalbert, personal communication). First, water monitoring activities are carried out under the flag of watershed associations. These associations exist since the end of the 1990s, were set up by the state of Pennsylvania and have later evolved into non-profit organisations. There are many such associations and their citizen science activities differ in terms of objectives and normative outlook. Second, there are non-profit organisations who involve citizens in monitoring water quality for advocacy ends. An

FIGURE 2: SHALE GAS EXPLORATIONS IN PENNSYLVANIA, USA (SOURCE: FRACKTRACKER.ORG)



example is Trout Unlimited, a NGO who fears that oil and gas companies' activities threaten fish habitats, and there are large environmental NGOs that engage in citizen science, like Sierra Club. Lastly, as indicated, concerned citizens have set up their own project or network.

Some community groups are furthermore supported by ShaleNetwork, founded by the National Science Foundation. They assist with the collecting, analysing, discussing, and disseminating of water quality data, and link them to universities who sometimes take up the chemical analysis of samples in their labs (Shalenetwork n.d.; Carroll, 2015). The network and groups of citizen scientists involved also closely collaborate with the Alliance for Aquatic Resource Monitoring (ALLARM), based at Dickinson University. This organisation trains volunteers on water sampling protocols and can provide them with the necessary equipment for free (ALLARM n.d.). Organisations such as ALLARM are described by Jalbert et al. (2014) as "hub organisations", taking a prominent position by providing the citizen science groups with training and other resources and support, creating partnerships and steering research objectives.

Jalbert et al. (2014) report the results of a survey held under watershed monitoring groups in New York and Pennsylvania, finding that 24 out of 76 groups are actively monitoring with the shale gas development in mind, especially to establish baseline conditions before the advent of drilling by considering parameters that are relatively easy and cheap to measure (e.g. conductivity, total dissolved solids, pH, temperature). These organisations primarily report the prevention of pollution (79%) and the protection of human health (67%) as main goals of their monitoring (Jalbert et al. 2014), which supports the idea that concerns over drinking water quality underpin the monitoring (Vidic et al. 2013). The database that is hereby created is openly accessible on the program HydroDesktop from the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (Brantley et al. 2012).

Because so many citizen science groups exist, all with their own objectives and practices, it is very difficult to assess the outcomes of their (combined) efforts. Generally, Kinchy et al. (2014) have identified consciousness-raising, environmental policing and science to be the main guiding logics of most of these groups, but which one of these logics dominate "...remains unsettled, and many groups appear uncertain about whether and how their practices might have an influence" (ibid.: 260).

The fact that community groups have to fill in for a lack of monitoring by state or federal agencies has been criticised by for instance Kinchy and Perry (2011), in part on the basis of worries that quality concerns will lead such agencies to disregard community measurements. On the other hand, Colaneri (2014) provides an interview with Gwen Ottinger of Drexel University, who argues that community groups actually have a compelling motive to adhere to strict quality control guidelines, namely that if worrying results are obtained, regulatory agencies will repeat the measurements anyway, but for these agencies to do so, a trustworthy enough "stink" has to be created first.

The majority of citizens living in the interior of the Marcellus, where most of the shale gas related activities take place, rely on their own well for drinking water. It is these people that are most at risk of being affected when drilling activities go wrong. Not being affiliated to a water authority or some other political body means they are not formally represented, nor is anyone doing water monitoring on their behalf. The minority that is affiliated to water authorities seems to be better off, not only in being formally represented, but also regarding their properties, which are higher valued because they are affiliated to a water authority (Muehlenbachs et al., forthcoming). Drinking water companies have generally adopted and maintained a low profile vis-à-vis the gas industry and any negative outcome associated with gas explorations, not least since some of them are selling water to the gas companies.

All in all, the lessons learned from this case are:

- Under conditions of a fast-growing shale gas industry in the state of Pennsylvania, combined with limited state-led research on gas explorations, the number of citizen science groups and projects investigating the effects on water have quickly gone up.
- The position of people who rely on their own well rather than being served by a water company (the great majority) tends to be most fragile, in particular in terms of influence vis-à-vis the shale gas industry, but also for instance regarding their property values that have gone down due to shale gas explorations. Citizen science offers one way to collectively address these and other issues.
- The effects of the growing number of citizen science projects in the area are, however, ambiguous and difficult to assess, due to a great variety of groups doing water citizen science, operating on different logics.

2.1.2 The Citizens' Water Advisory Committee in Tucson, Arizona

The city of Tucson lies in the southern part of Arizona, USA, close to the Mexican border, and has about half a million citizens. It is situated in one of the most arid parts of the USA and has a desert climate, with little rainfall. The city uses water from three sources: groundwater, recycled water and water from the Colorado River. The latter is transported over more than 500 kilometres, by an engineered canal that runs through desert land all the way south to Tucson, where it is mixed with groundwater. Drinking water production and management is in the hands of Tucson Water, a public water utility within the city government.

FIGURE 3: THE CANAL DISTRIBUTING WATER FROM COLORADO RIVER TO TUCSON THROUGH ARID LAND



Of particular concern to this report is the Citizens' Water Advisory Committee (CWAC). This committee has been established in 1977 and is one of many Boards, Committees and Commissions created by the City of Tucson. These are public bodies that "...provide advice to the governing body by working with City staff to facilitate studies, gather public input and assemble appropriate information for presentation to the Mayor and Council to assist in their decision making processes" (City of Tucson, 2010).

The CWAC is essentially an advisory and consultative body. It reviews all sorts of plans related to Tucson Water's operations, including water revenue requirements and rate adjustments, and the (long-term) Tucson Water Resources Plan. It also provides support to community programs and information on Tucson's water system if needed. The CWAC has three permanent

subcommittees: the Finance Subcommittee that looks after the utility's financial plan and budget; the Technical, Planning and Policy Subcommittee that provides advice on the utility's service plans and on infrastructure or water quality issues; and the Conservation and Education Subcommittee in support of the utility's conservation fund. Tucson Water has two employees who act as liaison to the CWAC, but in general, interactions between CWAC members and Tucson Water employees are frequent, depending on the specific plans or issues discussed.

The CWAC has seventeen members, who serve without compensation. Fifteen of them are residential or industrial customers of Tucson Water and they represent water customers in Tucson. The remaining two seats are reserved for the director of Tucson Water and the director of the wastewater reclamation division within the County office of Pima, where Tucson is located in. These two directors have no voting rights and do not count toward the quorum, which consists of eight members. Votes are taken to approve plans and to appoint members or functions within the committee. Committee members are sought with competence or expertise in areas such as utility rate making, water resources planning, hydrology, landscape architecture or water law. Interest to serve on the CWAC appears strong, with the committee fully appointed for quite some time now. Apart from holiday seasons, the committee meets on a monthly basis.

The CWAC's role in water related research is mainly an advisory one. Its members are generally not involved in design, research or execution of research, which is done by Tucson Water. Results of research projects are, however, presented to the CWAC and they are asked for feedback, which may feed into existing or new research projects (City of Tucson, 2014; 2015; CWAC, 2015 and personal communication with liaison officers of Tucson Water). But even though the CWAC's role is mainly an advisory one, the collaboration of the CWAC with Tucson Water translates into concrete actions, such as joint proposals for rate adjustments to the city council, a review of the water service area policy and the development and approval of the conservation program budget and associated activities.

All in all, the lessons learned from this case are:

- An institution such as the Citizens' Water Advisory Committee in the City of Tucson provides structural rather than occasional citizen involvement in water issues.
- All seats and roles in this committee have been taken up for a while and the committee meets regularly, indicating a high degree of willingness and interest of citizens to partake in water related issues in their city.

2.2 Europe

In Europe, the cases of Paris and Scotland are assessed. What makes Paris interesting, is a renewed emphasis on and strengthening of citizen involvement in water issues, a development instigated by the remunicipalisation process. During this process, control over water management and service delivery in Paris was taken back in public hands. Remunicipalisation of water management is a trend more widely seen in France, Europe and elsewhere in the world. For instance, a similar process took place in Berlin, although in Berlin this was driven mainly by citizens, whereas in Paris the main driving force were actors within the city council, notably the former mayor. We nonetheless chose Paris as case study, given the particular mechanisms and institutions that have been set up geared towards increased citizen involvement in urban water issues. Scotland represents a 'narrower' case, in that the object of research is one entity, the Customer Forum for Water in Scotland. This forum was established to providing input and advice in the Scottish Water's Strategic Review of Charges process for 2015-2020, from the perspective of Scottish citizens. Even though citizens were represented in this forum by high-level experts and ex-politicians, not particularly representative for the community at large, they undertook extensive research to gain insight into citizen's opinions and expectations. These insights were used to critically challenge the assumptions and intentions of Scottish Water about future charges and investments. While different in content and driving forces, both cases indicate the growing importance attributed to citizen involvement in water issues in Europe, although it appears as if citizen science cases related to (drinking) water are fewer in number than in North America (USA and Canada).

2.2.1 Citizen re-engagement in the context of water remunicipalisation in Paris

Paris, with 3.5 million daily water consumers, has quite recently gone through a so-called 'remunicipalisation' process. In this process, the city council took back full control over the city's water system, which had been delegated to private companies in 1984. From 1984 to 2010, subsidiaries of Veolia and Suez –two of the world's largest private water companies– managed Paris' water system, with the former serving the right bank of the Seine River and the latter the left bank. Many reports, however, indicated malpractices during their period of operation, including a lack of transparency and a profit generating scheme based on considerable tariff increases. Because of these and other factors, a newly elected mayor in 2001 initiated the first steps towards increased control of the city council over the city's water system. In his campaign for re-election in 2008, the same mayor went even further and pledged to bring back water service provision under full public control. He started the reform process right after his re-election. This eventually culminated in the newly established public and semi-autonomous water agency called 'Eau de Paris' to take over all operations from 2010 onwards (Pigeon, 2012; Le Strat, n.d.).



After remunicipalisation, a number of decisions were taken to improve customer relationships or, in the director's words, to put "water users at the heart of the service" (Le Strat, n.d.). One such decision was taken by the Board of Directors in 2011 to in-source customer services. This enabled the formation of a renewed relationship between the water company and citizens. Subsequently in 2012, Eau de Paris was awarded the prize for best Customer Service of the Year for water distribution. Moreover, the governance of Eau de Paris has been structured in a way that allows for a high level of public control and oversight. In the Board of Directors of Eau de Paris, not only representatives of the city council have voting rights, but so do two employees from Eau de Paris and a representative of the Paris Water Observatory. Besides that, representatives of civil society organisations serve on the Board with consultative rights, including the largest consumer association of France, an environmental association, a water expert from a national water research centre and an expert on water governance and participatory methods.



**Observatoire
parisien de l'eau**

The abovementioned Paris Water Observatory was established in 2006 by the city council as an extra-municipal committee and serves as "...a space for citizen oversight and information, and to make the elected representatives of the City of Paris, its administration and the employees of Eau de Paris accountable to citizens" (Petitjean, 2015, p. 70). It provides a link between citizens, Eau de Paris and the city council and acts as a platform in which information is shared and discussions and debates on water issues are taking place. Its members include representatives of water users such as public and private management agencies, tenants, consumer and environmental associations, and trade unions, as well as representatives from the Council of Paris and technical partners of Paris Water Services. The Observatory reviews and provides advice on all dimensions of the water cycle in Paris, from tariffs, water quality and water resources to the management of Paris' canals and fountains and the right to water for all. It organises meetings that are open to the general public and has set up technical working groups. Furthermore, all formal documents related to water management in Paris must be submitted to the Observatory before consideration by the city council (ibid.; Observatoire Parisien de l'Eau, 2015).

These measures taken and institutions such as the Water Observatory have given a boost to democracy, and have inspired others to consider similar interventions. They have enabled users to voice their concerns and ideas, and accountability mechanisms in place ensured that these were taken seriously by management and staff. They may have caused some processes to take longer, as issues need to be explained and understood by non-specialists, but it did enhance the public character of services. Processes such as these have led others, such as Veolia, to also consider the representation of users on their board and can thus be regarded a form of social innovation (Petitjean, 2005).

All in all, the lessons learned from this case are:

- Options for citizen engagement in water governance and management processes have increased during and after the City of Paris took back control from private operators over the city's water system and services management.
- Promising such options include the establishment of an independent water observatory and the diversification of the Board of Directors of Eau de Paris, Paris' water company with civil society groups.
- The case shows that the institutional context and type of water governance and management in a city matter for how, and to what extent, citizens are engaged in water issues.

2.2.2 The Customer Forum for Water in Scotland

In 2011, a Customer Forum for Water was established by Scotland's water regulator, the Water Industry Commission for Scotland (WICS) in liaison with Consumer Focus Scotland¹ and the national water and sewerage company, Scottish Water. This forum was to play a formal advisory role in the Scottish Water's Strategic Review of Charges process for 2015-2020. The goals of this forum were to engage with Scottish Water in qualitative and quantitative research to gather information about customer's priorities regarding service levels vis-à-vis tariffs, representing these priorities and preferences to Scottish Water, and based on these, seek to secure the most appropriate outcome for customers (Customer Forum for Water, 2015).

WICS proved to be the main driving force behind the customer forum. One of their statutory objectives is to 'determine the lowest reasonable overall costs' (Littlechild, 2014), but how exactly to determine or accomplish this had become somewhat unclear in a context in which they had stopped benchmarking against English companies and in which the previous two reviews of charges noted decline in costs, increased efficiency and service improvements. WICS felt unhappy with the way customer involvement occurred by Scottish Water. In short, it sought a novel way to challenge Scottish Water's regulatory and decision-making practices and aimed for increased customer involvement in their decision-making processes. The WICS then tried to bring other parties on board, and seek out how a customer forum would coalesce with existing statutory frameworks. After having sorted this and other issues out, a detailed formal agreement between the forum and Scottish Water was signed and the forum started operating in 2011. Its members were all experienced politicians, academics or professionals, with different backgrounds, thus bringing in a variety of views (ibid.). Customer consultation occurred primarily through research that the forum, in collaboration with Scottish Water, designed and carried out.

Overall, in the eyes of its members and an external reviewer, the forum is considered successful (Littlechild, 2014; Customer Forum for Water, 2015). The forum's involvement in the price-setting process did not change the underlying assumptions about 'key price control parameters' like cost of capital and future efficiency improvements so much, but it did empower the voice of customers in this process. In the reviewing of service improvement reports, it questioned many of the ideas and assumptions of Scottish Water, who was subsequently forced to rethink and in some cases, adjust those. It managed to secure customer benefits, which would probably not have been secured without pressure of the forum. Understanding of Scottish Water about what customers want is said to have improved and it developed a stronger customer orientation that is witnessed, for instance, by better accessible and readable business plans.

All in all, the lessons learned from this case are:

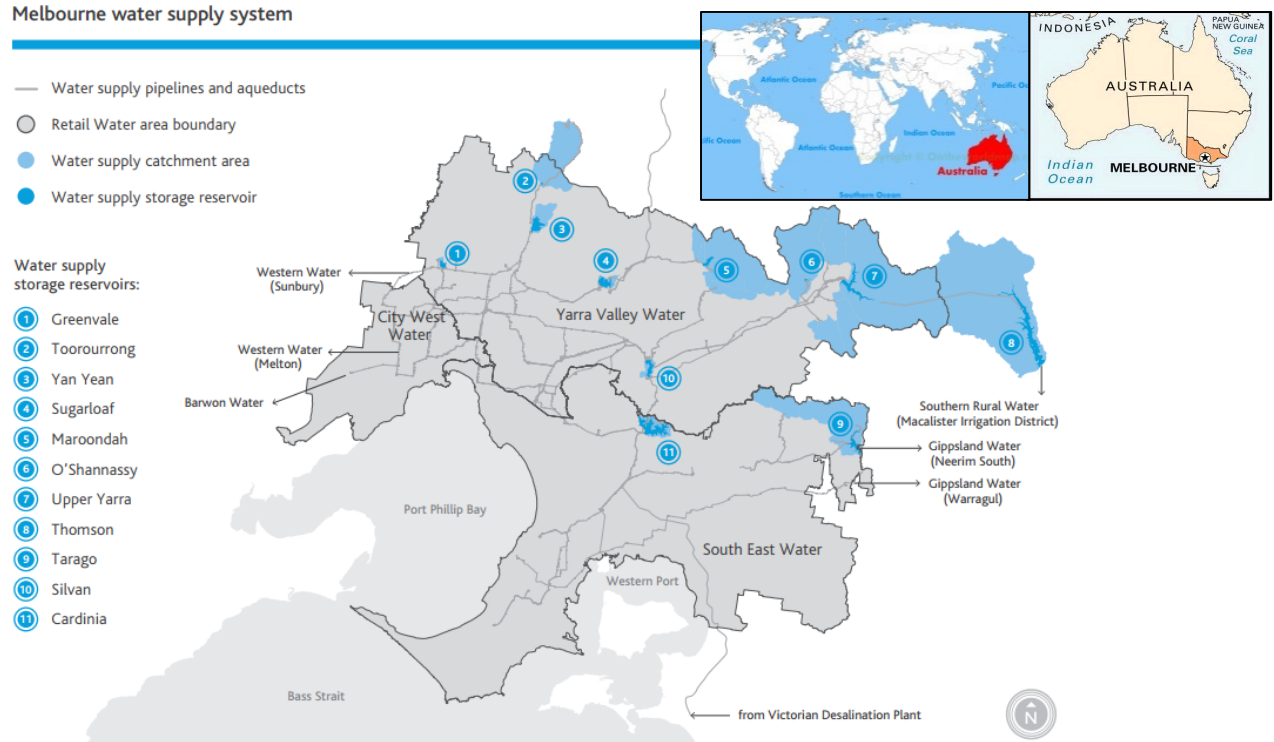
- Establishing an independent water customer forum aimed at investigating customer's preferences, and promoting these in an organisation's decision-making framework, requires perseverance.
- Once established, however, a customer forum like the one in Scotland can much improve decision-making and make it more transparent, by critically assessing and changing assumptions regarding investment decisions that were previously taken for granted by water professionals.

¹ Now: Citizen Advice Scotland

2.3 Australia

The two cases explored in this continent are both situated in the Melbourne area (State of Victoria) and are indicative of other, similar ones elsewhere in Australia. Water management and the production of drinking water in the greater Melbourne area is in the hands of a wholesale water company, called Melbourne Water. Melbourne Water supplies water to metropolitan water utilities, who in turn supply citizens with drinking water. Both Melbourne Water and the metropolitan water utilities have mechanisms in place for citizens to become engaged in water related topics. The cases below describe such mechanisms of Melbourne Water and of one such metropolitan water utility, called Yarra Valley Water. The map below shows the greater Melbourne area and its water supply system run by Melbourne Water, as well as the service area of Yarra Valley Water. Melbourne Water has multiple programs aimed at citizen involvement, including the possibility for citizens to voice their opinion on water investment priorities in a so-called price submission process and the Waterwatch Program, in which community groups carry out water monitoring programs. Yarra Valley Water, directly delivering water services to community, has a Community Advisory Group involving citizens in strategic and operational decision-making by the water utility.

Melbourne water supply system



The greater Melbourne area, the water supply system in place, and the service area of Yarra Valley Water
(source: Melbourne Water, 2015a, page 27)

2.3.1 Price submission process & the Waterwatch program of Melbourne Water

Owned by the Victorian government, but independently run, Melbourne Water controls much of the water system in the greater Melbourne area. This includes water reservoirs as well as waste water treatment plants and drainage systems. Melbourne Water is the wholesaler of drinking water. It serves water utilities, like Yarra Valley Water discussed in the next section, who in turn provide water to citizens. Even though Melbourne Water does not directly serve citizens, their operations and policies do have impact on customers in various ways and their

services are indirectly paid for by citizens. They have a number of programs aimed at citizen involvement in water related topics.

One is a large consultation program Melbourne Water carried out for its 2016 price submission to the independent regulator, the Essential Services Commission. In this process, Melbourne Water asked input about service levels, regulatory requirements and planned investment and prices from various stakeholders, including community and industry groups, water utilities, local councils, governments agencies and citizens via an online survey. The consultation resulted in a demand for cost reduction, which Melbourne Water tries to achieve through efficiency improvements, whilst maintaining service levels. The recommendations formulated on the basis of the consultation are rather standard, such as 'making bills more affordable', investing for future growth and capacity', 'maintaining safety and reliability' and 'more sustainable services' (Melbourne Water, 2015a).



Digging deeper, the single major item of controversy in the price submission relates to the Victorian Desalination Project (VDP). This project involved the building of a desalination plant that should provide water in times of drought, but it has not been used since it became operational in 2012. Plans for this project were strongly opposed by community groups, because of its alleged environmental impacts (e.g. high energy consumption and the plant being situated in a precarious coastal environment), a non-transparent political process between the state and powerful companies that would form the winning consortium called AquaSure (which involves Suez and Australia's biggest private equity fund Macquarie) and above all, the high costs required, which eventually rose to four billion Australian dollar² (Watershed Victoria, 2009). Each year, Melbourne Water pays almost half a billion Australian dollar for the plant's debt and operation (through the Victorian state) to AquaSure that owns, manages and operates the plant. This has translated in major water bill increases for citizens, and this has therefore been amongst the main subjects to be considered in the 2016 price submission. Although the reports do not give much detail about the outcomes of the consultation on this point, only that they are 'mixed', they decided to spread out a 'relatively small proportion of the VDP payments, totalling \$100M, over the regulatory period' of 2016 – 2021 (Melbourne Water 2015b; 2015c). In the end, the Victorian state and thus Melbourne Water is bound by the contracts signed with AquaSure, and cannot therefore easily restructure the repayment schedule, even if citizens wanted to.

Next to the price submission process, Melbourne Water funds and coordinates an initiative that closely involves citizens and/or societal groups: the Waterwatch program. The Waterwatch program is aimed at connecting people (e.g. communities, schools) with waterways in their neighbourhoods, thereby stimulating the protection and conservation of these waterways. Several types of events are organised in which (groups of) individuals can participate, such as workshops, forums, information nights or discovery bike rides along creeks. Games and interactive tools have also been developed, from 'murder under the microscope', a game in which detective teams solve a fictitious eco-crime, to games in which the mission is to help a fictitious family save water or calculate a family's water usage. Then there is a major volunteer monitoring program, with over 140 groups who monitor over 400 sites across five major catchments in the Port Philip Bay and Western port, an area that includes but extends beyond the city of Melbourne. Each group and their volunteers are assigned a Waterwatch coordinator who provides them with specialised training and support to design and carry out their own monitoring program. They assess quality and health of waterways, by monitoring such things as water temperature, the acidity and turbidity of

² Which, in 2009, approximately equalled 2,5 billion euros.

water (pH), as well as (the variety of) water bugs. The information is made available to Melbourne Water, the Environment Protection Agency of Victoria and local councils.

All in all, the lessons learned from this case are:

- Consulting the public on water issues in the area through several communication channels reveals valuable information about customer's preferences, which in turn influences investment decisions and plans, for instance regarding water bills.
- The Waterwatch program of Melbourne Water includes a variety of ways in which the public can become involved in learning about, and taking part in research on local waterways, including monitoring of biodiversity and water quality and several types of interactive, outdoor games.

2.3.2 Melbourne's Yarra Valley Water and its Community Advisory Group

Yarra Valley Water is the largest of three Metropolitan water retailers in Melbourne, providing water and sanitation to more than 1.7 million people. It gets water from Melbourne Water, the wholesaler of drinking water, who also supplies water to two other metropolitan and fifteen non-metropolitan water retailers.

Yarra Valley Water has two Consultative Committees, the Community Advisory Group and the Environmental Strategy Advisory Committee. In the latter committee members participate who are experts in sustainability, and have provided the water company with advice on several sustainability related topics, including the reduction of greenhouse gas emissions, water conservation, nutrient and heavy metal discharges, integration of the Natural Step principles into its business, the meaning of the very concept of sustainability, community behaviour change and long term planning (YVW, 2015). The composition of the committee varies with the topics discussed. They met twice a year in the past, but now they meet on an as needs basis.

The Community Advisory Group (CAG) has been created along with the establishment of Yarra Valley Water itself, in 1995. The committee is made up of citizens living in the service area, and of representatives of customer groups. As such the committee is meant to represent the interests of various community stakeholders. The goals of this group are, moreover, to provide advice to the Managing Director and Senior Management on various community issues, assist in the development of YVE policies, initiatives, programs and communications, and to contribute to YVW's knowledge and understanding of community needs (YVW, 2010). The group meets three times a year for the duration of three to four hours, which are also attended by YVW's Managing Director and at least one other YVW executive. The quorum of the committee consists of a majority of Committee members. New members of the committee are provided with an "induction program, which includes assigning a YVW employee as a 'buddy' or mentor for the first 12 months" (ibid.).



The CAG provides advice on request of YVW, as well as unsolicited advice, potentially on all aspects of the company's business. The issues that the committee is asked to advise about include service delivery, digital solutions, pricing considerations and policy directions. YVW stimulates its business departments to think about opportunities to engage the committee for better design of policy and service delivery, although it remains a challenge to actually have departments do this. The planning of CAG meetings and the content of its agendas is decided on in an early stage, preferably 12 months ahead, so as to maximise the quality of input of the committee on YVW's plans. In addition, the CAG is provided an annual YVW work plan so they know about important deadlines well in advance, such as the submission of the

corporate business plan to the government and the submission of the company's plan to the Essential Services Commission, the independent regulator. The CAG meetings are generally approached as workshops, where members are not only asked feedback, but engage more actively in problem-solving and work towards the co-creation of policies or plans. Citizens are also regularly asked feedback on YVW's services through quantitative and qualitative studies, such as deliberative forums, but they do not actively participate in research project design, formulation of research questions or data collection.

The CAG is mutually beneficial, they say; citizens learn more about water issues, policies of YVW and feel being listened to, whilst YVW better understands citizens and make better policy by closely working together with them.

All in all, the lessons learned from this case are:

- Structural involvement of citizens in decision-making practices through an institutionalised Community Advisory Group can be mutually beneficial; citizens learn about the water company and water management, whilst professionals and departments of the water company get advice about and insight into customer's preferences and ways of thinking.
- Meetings and sessions are designed in a way that allows for active and joint problem-solving and learning between the Community Advisory Group and (management) representatives of the water company.

2.4 Asia

This last section, on Asia, deals with the cases of Singapore and Seoul. Both these cities have gone through a rapid and intensive modernisation and urbanisation process during the second part of the 20th century. Managing major water issues have been central to this process. This in particular applies to Singapore, a city and a state in one, who is ambitiously working towards increased water self-sufficiency. This ambition has been operationalized into a program called NEWater, in which treated wastewater by innovative technologies is mobilised for non-potable water uses in Singapore, now already meeting 30% of total demand. Related activities have been set up to inform and involve citizens about/in this development. Technology also features centrally in Seoul's effort to ease citizens, whose water utility has developed an online portal that citizens can consult for various water quality parameters in their living area. Singapore, moreover, has set up a major program to redesign and rebuild waterways and (concrete) water infrastructures so that they better fit into areas and environments in the city, and which should stimulate citizens to become (better) connected to their local waterways.

2.4.1 Public engagement in NEWater, ABC Waters & water chatters in Singapore

Since its independence from Malaysia in 1965, Singapore has worked towards increased self-sufficiency in the water domain (Tortajada & Joshi, 2013). In the context of a fast-growing city-state with limited space and increased water consumption in a water scarce area, this has been a major challenge. Singapore traditionally relies on the Malaysian province of Johor for the bulk of its water supply, and four bilateral agreements arrange the two-way exchange of water until 2061. Increased self-sufficiency required Singapore to diversify its water resources and it started exploring so-called 'unconventional resources'. Next to desalination as one such unconventional resource, Singapore initiated a study in 1998 to assess the potential of reclaiming wastewater. This has resulted in the programme of NEWater in 2003, in which advanced technologies such as reverse osmosis are used to treat and turn wastewater into water of very high quality, mainly meant for non-potable uses. Currently,

there are five NEWater plants, meeting 30% of Singapore's total water demand and this is meant to be raised to meet 55% of total demand by 2060 (PUB, 2015)

Public perception has proven key in this process. Initially, recycled wastewater was not regarded highly by the public and the Singapore water agency PUB therefore devised a strategy to build trust in this resource and enhance its acceptability. Rebranding constituted a major element in this strategy. They stopped talking about wastewater and instead introduced the term NEWater, and likewise renamed wastewater treatment plants as water reclamation plants (Tortajada & Joshi, 2013). Another essential element in the strategy has been intensive education and raising awareness by the opening of a visitor centre and by

FIGURE 4: BISHAN PARK BEFORE AND AFTER DEVELOPMENT UNDER THE ABC WATERS PROGRAMME. A MAN-MADE RIVER HAS BEEN CREATED AS PART OF THIS ABC WATERS PROJECT (SOURCE: MOTHERSHIP, 2014)



providing workshops, trainings and programmes all dedicated to the technologies and processes underpinning NEWater. Surveys showed the success of this strategy, with a high acceptance rate of NEWater as a potential source of drinking water at the start and in later stages of NEWater (Brouwer et al, 2015; Irvine et al., 2014).

The water agency of Singapore (PUB) has furthermore introduced 'ABC waters' in 2006: Active, Beautiful and Clean Waters. This programme aims to transform the 'utilitarian-looking water infrastructure into beautiful and clean streams, rivers, and lakes which also serve as community spaces for all to enjoy' (PUB, 2015). 'Active' in this initiative refers to community engagement and recreational spaces, 'beautiful' to integrated water plans in sustainable urban development and 'clean' to improving the quality of water. About 60 projects have been completed to date and another 40 are in various stages of implementation (Centre for Liveable Cities, 2015). Communities have been involved in various ways; in the early stages of the initiative, a public exhibition was held to increase public buy-in and support. In the various projects carried out under the programme, communities are consulted on the project design stage and once a project is finalized, community members in the vicinity of the project can adopt such a site and/or become so-called Friends of Water Stewards. Moreover, a Waters Learning Trails Program has been developed. Participants in the trail learn about Singapore's water management and the rich biodiversity at sites.

Lastly, there is a website called 'water chatter' that describes itself as a 'place for water lovers to come together and share our thoughts on water'. The target group are netizens, a portmanteau of 'Internet' and 'citizen'. It appears as if netizens have initiated and maintained the website, but this is actually done by PUB itself. Likewise, articles are said to be written by netizens, as well as staff and partners of PUB, but it seems the latter two groups submit most of the articles. The readership has been relatively low to date (personal communication, 2015).

This points out that mutual engagement of citizens and water companies is rather low, even though the NEWater campaign clearly had an impact on citizen's view on treated wastewater. All in all, the lesson learned from this case is:

- Communication campaigns specifically adapted to the target groups' imagination can significantly influence public perceptions and uncertainty on alleged controversial water topics such as NEWater, the Singaporean version of treated wastewater.

2.4.2 The Seoul Water Now system

The Seoul Water Now system in South Korea was initiated by the Seoul Metropolitan Waterworks (a subdivision of the municipality) in 2001 to ensure a continuous water quality monitoring network, from source to tap, for the city's water supply system (Office of Waterworks, n.d.). As of 2005, this data can be retrieved in real-time from the Waterwork's website, showing measurements for turbidity, pH and residual chlorine (see Office of Waterworks, n.d.). In 2009, the system received a United Nations Public Service Award for the system (UNPSA, 2009). A main goal of the project was to increase public trust in the quality of the water, as many people did not feel comfortable drinking it at the time (UNPSA, 2009). Along with rolling out the online portal, the water supplier also made free house calls to citizens to test the water quality directly from their taps, called the Arisu Quality Certification System, and this service had been performed for 2.6 million households by 2009 (Office of Waterworks, n.d.). According to the description provided for the Public Service Awards, the use of tap water increased by 20% following the program, and 76% of households receiving the Quality Certification had greatly increased their trust in the drinking water (UNPSA, 2009). However, fruitless attempts to gather more in-depth information about makes it difficult to say to what extent the combination of systems is still contributing to increased trust in- and use of tap water. Obviously, the actual involvement of the public in this case is also limited.

All in all, the lesson learned from this case is:

- Modern digital possibilities make it easier for water companies to share real-time data about drinking water quality parameters with citizens.

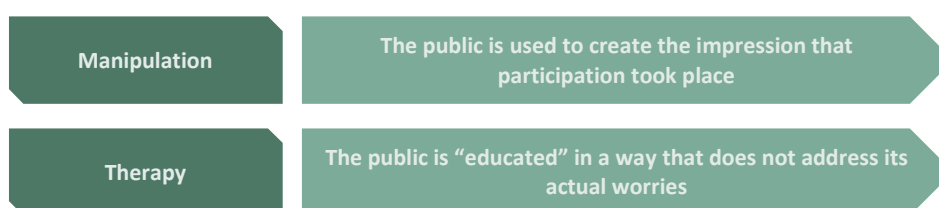
3 Types and degree of public participation in the cases explored

The cases described in the previous chapter clearly show the variety of ways in which citizens are (and can be) engaged with water issues and/or their water company. From informing citizens on water quality data in Seoul to building institutions for structural citizen engagement in water issues in Paris, water companies around the world are striving for more, and better kinds of, citizen involvement in water related issues.

However, intentions do not necessarily translate into actual and meaningful involvement of citizens. This, indeed, is the very message underpinning Arnstein's (1969) Ladder of Participation. To briefly recall; this ladder acknowledges different degrees of participation, from participation used as marketing instrument rather than actual involvement of citizens (manipulation) to genuine involvement, whereby significant decision-making power is delegated from institutions to citizens. The ladder thus revolves around the spectrum of citizens having various degrees of (decision-making) power, to them having none. The question addressed in this chapter is to what degree citizens actually appear to be involved in the cases discussed. We use 'appear' as desk study and personal communication over distance made it rather difficult to deeply investigate and corroborate claims on participation.

We proceed by discussing in more detail the various steps of the ladder and assess if cases match characteristics pertaining to these steps. We do so by sticking to the typology that Arnstein proposed, making a distinction between non-participation, degrees of tokenism and degrees of citizen power. We use this ladder as main organising framework in this chapter, given the broader scope the cases fall into.

3.1 Non-participation



Both manipulation and therapy are steps that Arnstein considers forms of non-participation. Manipulation involves the use of citizen participation as a 'public relation tool', merely to create the impression that participation occurs. In practice, there is a one-way communication from those in power/holding office to the target group, often to the detriment of people who have difficulties voicing their opinions. Arnstein speaks of therapy when people's concerns are reframed as some kind of personal deficiency or mental illness. Instead of focusing on structural conditions or evident power play that bring harm to people, the cause of problems are sought in people's individual habits and lives. Involving people in decision-making then translates into them being educated or provided with some sort of therapy under the heading of citizen participation.

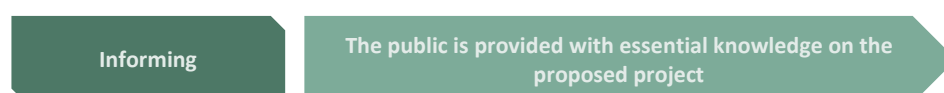
Without additional on-site research it is difficult to tell whether the tools and mechanisms in the cases described in the previous chapter actually empower citizens to a greater or lesser extent, or merely keep up appearances of citizen involvement. For instance, Arnstein, writing on the USA context and in a different time period (1960s), gives various examples of similar committees like the Citizens' Water Advisory Committee in Tucson (CWAC) that, on closer look, have not empowered citizens in decision-making practices at all. This is not to say that this is applicable to the CWAC, but whether or not citizens' involvement is actually making a difference in water management decisions can only be safely claimed by looking in more detail to a committee like this.

What also matters in relation to non-participation is the broader political-economic context in which forms of citizen participation are initiated or tried out. Singapore is a case in point; Tortajada & Joshi (2013), amongst others, claim that public participation, civil society organisations and activism are accepted in Singapore, sometimes even encouraged, but on terms and parameters defined by and in line with goals of the government, that is, above all, an apolitical form of civil society engagement (Tortajada & Joshi, 2013). In such a context it remains to be seen whether the initiatives of PUB, Singapore's water company, really do mobilise citizen participation, let alone devolving power to citizens. **NEWater**, for instance, was clearly a strategy of the Singaporean government meant to diversify its water sources and only after the strategy and choices were made, the public became 'involved', i.e. educated on NEWater's alleged benefits.

Then there is the case of **water citizen science in Pennsylvania**. In one sense, the degree of citizen involvement in this case is amongst the highest of all cases presented in this report. However, and relative to the level of involvement, the impact of these citizen science groups in terms of adaptation of decision-making practices and frameworks appears to be rather low so far, or at least fragmented. This is not necessarily because of the efforts of these groups, which are significant, but has rather to do with the political and institutional environment in which they carry out their projects. Public organisations have tended to privilege stakes and arguments of the gas industry over those of citizens, and, moreover, have cut their research budgets so that less state-led investigation is undertaken into the effects of shale gas operations. This is in fact the very reason that citizens have taken matters into their own hands, but it does reveal that they are very minimally involved and are attributed little power in formal decision-making processes related to water in shale gas exploration sites.

Assessing this case in relation to the power dimension underpinning Arnstein's framework does not, however, say much about citizen involvement in the research projects themselves. That is why assessing these cases in relation to the citizen science framework given in table 2 (chapter 1) says more about how citizens are involved and in which stages of the project. Because the stakes are high for people living in the shale gas exploration sites, they are often very motivated to participate in various stages of the research project, including the definition of the research question, data collection and even the interpretation and analysis of data. Indeed, from this perspective, citizen involvement seems to be one of the highest of all cases explored.

3.2 Degrees of tokenism





In each of these three steps citizens are given some sort of ‘token’ allowing them to voice their opinions. The type of token matters for the degree to which people can raise their voice and the impact this has. According to Arnstein, informing is the first step in the ladder towards real citizen participation. After all, raising concerns and formulating arguments require information about a particular situation. However, this is still very much a one-way communication from those holding office to citizens through such tools as news media, posters and the like, and they often do not really empower citizens. Consultation includes the use of surveys, meetings and public hearings in which citizens are actually asked to give their opinion on something. This is an important step, provided that it is combined with other participation tools. If this is not the case, there is a chance that citizens only “participate in participation”. In other words, they may fill out questionnaires, but nothing meaningful is done with the input. Placation, lastly, involves such processes as inviting ‘regular’ citizens in municipal or other committees, enabling them to express their views and priorities on a more structural basis. If the majority of seats (and hence, votes) are still taken up by powerful actors, then placation remains somewhat of a red herring.

It is this part of the ladder that most cases seem to fall into. The **Seoul Water Now** case offers a prime example of informing the citizenry. It is a one-way transfer of information, from the urban water company to citizens, in which the latter are informed on water quality parameters. Citizen can check the (real-time) data, but there are no specific tools or options for citizens to act in response to the data they receive, apart from the usual communication channels (e.g. company e-mail, telephone, Q&A). The information system was initially meant to enhance trust of citizens in water delivered through large-scale water infrastructures, which many people were unfamiliar with. For the water company of Seoul, it thus provided (and still provides) a means to ease citizens. But would the data reveal alarming levels of quality parameters, then this provides citizens with important information on the basis of which they can take further action. In that sense, it can also be regarded an important first step towards actual citizen involvement.

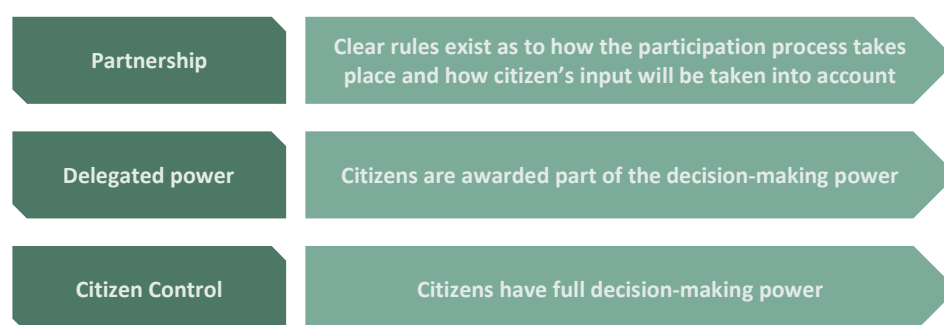
Notwithstanding the comments made in the previous paragraph, the **NEWater** and **ABC Waters projects in Singapore** also in a way relate to these steps of participation. The major promotion campaigns about NEWater, even though they mainly have an educational purpose, do provide essential information about the process and content of NEWater. ABC Waters even seeks to consult or even actively involve citizens, in various stages of concrete urban planning projects, but the strong top-down architecture of ABC Waters raises questions regarding the extent and earnestness to which citizens are involved.

The **price submission process of Melbourne water** seems to be a typical consultative way of involving citizens. Although the water company offered multiple ways for citizens to give their opinion, it seemed like the interpretation of input and the formulation of actions was done primarily by Melbourne Water officers. And even though the report and modern brochures suggest otherwise, these officers seem to have had little manoeuvring space in decision-making about (some of) the water topics under consideration. This in particular applied to the decisions related to the desalination plant, in which Melbourne Water is bound by contractual obligations that do not allow for major deviations.

The **Customer Forum for Water in Scotland** has elements which fit both the consultation and placation steps of citizen involvement. Despite initial skepsis of Scottish Water, actors in favour of this forum managed to establish it, give it a formal status and a central place in the Scottish Water's Strategic Review of Charges process. It fits the label of placation, since the Forum had considerable power in the decision-making process, and were able to significantly influence (assumptions underpinning) investment decisions. But it is also reflective of consultation, given that the Forum members based their input to Scottish Water on surveys among the wider public in which they asked about all kinds of water investment related aspects. The reason why this case is not related to higher forms of participation (see next paragraph) is twofold. One is that the very reason for establishing the Forum in the first place was very much driven by the water regulator struggling with its diminished power position and by its search for new ways to legitimate its role, rather than citizens demanding increased involvement. A second reason relates to the Forum's composition; all members of the Forum were people who are or have been in high-level positions themselves, including former politicans and academics. They are not very representative of the public at large, which is why they heavily depended on involving the public in ways that match the steps in this part of the ladder.

Yarra Valley Water's Community Advisory Group (CAG; Australia, Melbourne area) as well as the **Citizens' Water Advisory Committee in Tucson** (CWAC; USA) provide good examples of placation. Both groups exist for quite some time and are institutionalised within the decision-making framework of the water companies in both places. The groups come together on a frequent basis, the CWAC more than the CAG, and they get access to all sorts of information, including business and investment plans. However, the power position and degree of participation of both committees is limited to an advisory role. Their voice and recommendations are taken into account, but in the end, decisions are taken by (the management of) water companies themselves.

3.3 Degrees of citizen power



These steps highest in the ladder point at degrees of citizen participation in which power is actually shared between citizens and decision-makers. Partnership refers to joint planning and decision-making frameworks, with citizens having a power base in their community that enables them to hold officials accountable or enforce meaningful participation in decision-making processes. Delegated power goes one step further, and refers to citizens having the majority of seats in committees and the like, as well as having clearly described (power) instruments. Hence, those in power cannot but bargain with citizens if they are to advance in decision-making processes. Citizen control, lastly, is the step in which citizens themselves govern programmes, or even institutions, and are able to negotiate the conditions under which decisions are made.

The case that, on the basis of the information gathered, qualifies for a more extensive form of citizen participation is the one in **Paris**. One major driver for undertaking the process of remunicipalisation in Paris was precisely the trend that citizens had become ever less involved in water management during private ownership and management. Remunicipalisation sought to stop and reverse this trend. This occurred after the process was finalised and in ways that seem to go beyond mere tokenism. Decision-making frameworks of both the municipality of Paris and within the water company Eau de Paris were set up such that decisions can only be taken with extensive deliberation or even explicit consent of citizens and their representative groups. Such groups became voting member of the board of Eau de Paris, whereas a Water Observatory, an independent institution, delivers structural feedback and consultation to both Eau de Paris and the Municipality of Paris. Those taking up the highest positions within both Eau de Paris and the Municipality of Paris have themselves initiated these changes and/or backed them up personally, emphasising the willingness to make extensive citizen involvement possible. The case does not appear representative of citizen control, the highest form of participation, but rather mirrors features of partnership and delegated power in Arnstein's ladder; there are clear rules in place that not only empower citizens in raising their voice about water issues, but also make sure personnel of the water company take feedback into account or even adapt decisions based on feedback.

4 Conclusions

The aim of this report was to explore how, and to what avail, citizens in various places in the world engage with water issues and water companies in their city or region. Our search initially focused on citizen science projects related to drinking water, but was later extended to include other types of citizen participation and on other elements of the water cycle than drinking water only. Adopting this broader scope was due to the small variety in citizen science projects found in a desk study, both in terms of foci –most were aimed at joint data collection on waterways- and in terms of geography, as most of the water citizen science cases were found in North America.

We ended up exploring eight cases, dispersed over four different continents and differing in types of involvement, from water citizen science in the USA to the provision of real-time data about water quality in Seoul. Next to using a framework for assessing citizen science projects, we used the ladder of Arnstein (1969) to assess the cases in terms of degrees of participation and degrees of power-sharing between water organisations and citizens. The steps in this ladder range from non-participation, or illusive forms of participation, to significant citizen control over decision-making practices and frameworks.

The study pointed out that there is something to learn from each case in terms of how and to what degree people can be involved in decision-making processes related to water. We have assessed types of participation that mainly run in one direction, from the water company to citizens. In these cases, the degree of citizen participation is low, as for instance in the provision of water quality data by the Seoul water company to its customers. Nonetheless, sharing data is one important step towards higher level of participation; on the basis of data citizens may demand more and deeper types of involvement. Then we explored several cases, like in Tucson (USA) and Melbourne (Australia) in which citizens were organised in committees, advising the water company on strategic and management aspects on a structural basis. But where their role remains advisory, (groups of) citizens in Paris have been provided with more powerful participation instruments, such as seats with voting power in the Board of its water company.

The findings in this report are based on data gathered through desk study and personal communication over distance, which limits the ability to corroborate claims on participation. Future research could therefore investigate some of the cases in more depth and assess in a more rigorous way whether and how a certain type of participation has led to power-sharing between citizens and water organisations.

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