Picturing waters: a review of Photovoice and similar participatory visual research on water governance

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Seeing is one of the main sensory experiences for knowing water and for generating meanings of it. To acknowledge this, visual research methods are increasingly popular in social sciences. In this paper, research using Photovoice or similar participatory visual methods is reviewed in order to assess their potential contribution to the study of water governance. A total of 23 articles related to 20 projects on (1) water, health, and sanitation; (2) participation in water management; (3) landscapes and water spaces; and (4) domestic urban waters, were identified. They are assessed on the basis of the research's purpose, participants, visual outputs, and outcomes. Results are discussed against the three main goals stated by Photovoice's advocates: to record and reflect on communities' strengths and concerns, to facilitate critical dialogue, and to reach policymakers. We find some evidence about participatory visual methods contribute to the first two goals. However, while most articles assert that Photovoice proved an effective tool for communicating participants' views to a wider audience and for reaching policy makers, data and analysis on these processes are generally lacking. Documenting and reflecting on these processes are crucial issues that future visual research on water governance should address, particularly in a time when science is increasingly asked to outreach and impact on societal issues. © 2017 The Authors. *WIREs Water* published by Wiley Periodicals, Inc.

INTRODUCTION

Scholars—in particular social scientists—study water mainly through writing and reading, while people experience it by mobilizing the whole spectrum of senses: taste, touch, smell, hearing, and sight. This review focuses on the use of the latter, in view of the growing popularity of visual research methods in social sciences. Given water's 'mesmeric qualities,'[1] seeing plays a crucial role in influencing how people know water and generate meanings about it. However, in most industrial countries water is 'conquered,'[2] piped, and flushed away[3] through knowledge and capital intensive services, and has become invisible and de-socialized.[4] Water often disappears during the expansion of human settlements, when rivers are covered or hydrogeological limits challenged. Equally, global trade fluxes hide 'virtual' or 'embedded' water. Thus, visualizing water might contribute to highlighting water's universal meanings,[5] to situating them in specific historical, social, political and geographical contexts. Visualizing water may also help to re-socializing water, which emphasizes the interplay between society, nature, and technology. Perhaps, it is not a coincidence that creative projects on water at the crossroad between art, research, communication, and civic engagement are blossoming everywhere.[a]

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This review addresses the potential contribution of participatory visual research in the study of water governance. As it was acknowledged that the current water crisis is mainly 'a crisis of governance,'[6] the term 'governance' has gained popularity within international water institutions and studies. However, water governance remains a broad concept, with no shared understanding of its content and meaning.[7,8] The term has informed normative, descriptive, and instrumental analyses within academia[9,10] and has resulted in mainstream water institutions prescribing how water should be managed. It also generated analytical descriptions and critical investigations of the processes of water distribution and uses, including discussions on how the reference to water governance legitimizes these processes.[11,12] This review understands water governance as the processes that address 'the questions about water distributions and their organization and coordination: distributions of water (and of water related rights, risks, responsibilities, benefits, and incomes), as well as distributions of (scientific or political) voice, power and authority. Importantly, questions include those about the linkages between these different distributions.'[13]

Aiming to contributing to debates on equity and justice in water governance,[14] this review is concerned with on one of the main problematics associated with the notion of (environmental) governance, that of political participation, or 'the core political questions of whose voices get heard and who makes decisions.'[15] In this context, the review focuses on a specific method, Photovoice, as it is one of the most widespread participatory visual techniques. Inspired by social constructivism, empowerment education, feminist theory, and documentary photography, the proponents of Photovoice emphasize strongly how it can support the empowerment of research participants—mainly local communities or vulnerable groups—in the identification, analysis, and transformation of local problems. As stated in a seminal article by its initiators,[16] main goals and intended outcomes of Photovoice are as follows:

1. to enable people to record and reflect their community's strengths and concerns,
2. to promote critical dialogue and knowledge about important issues through large and small group discussion of photographs, and
3. to reach policymakers.

To achieve these goals, the Photovoice method places the camera in the hands of research participants—usually small groups of maximum 20 persons—,

asking them to take pictures about the matter of concern[17] for at least one week. Pictures are later used to elicit information and reflection on participants' life experiences, both in individual interviews and group discussions, to raise awareness, trigger debate, and instigate social change. To these ends, visual outputs are often presented to the wider community or policy makers by dint of photo-exhibitions, publications or public events. Photovoice is sometimes referred to as Photo-Novella,[18] or Photo-Story if participants are asked to record their observations in written diaries.[19,20] This review equally considers those and other participatory visual methods inspired by Photovoice and sharing similar goals. Their common denominator is that researchers ask the participants to take pictures of specific issues and then they elicit information with the participants from those photos. This technique is often referred to as 'auto-driven photo elicitation' or 'respondent generated image production.'[21] Here the label 'Photovoice' is used for readability but keeping in mind that several similar methods exist.

Previous reviews of Photovoice projects have mainly concerned health issues.[22,23] In their review of Photovoice projects on environment and social justice issues, Powers and Freedman[24] identify 4 of 17 projects that are water related; they have been included in this review too.

This article aims to understand the added value of Photovoice and participatory visual research for the study of water governance. In doing so, it takes a critical approach to the 'participatory turn' that has been influencing social and visual research in the last two decades.[25,26] As argued by Pauwels, Photovoice, and other participatory visual methods are based on 'largely undisclosed assumptions' and are 'often characterized and advocated by their intended outcome, and lack both empirical evidence and methodologies for arriving at that outcome.'[21] For this reason, the projects reviewed here are assessed by according to some of the aspects that for Pauwels need further elucidation in order to offer a 'critical-constructive assessment of epistemological, methodological, and social activists tenets' in participatory visual research.[21] The aspects discussed here are:

- the distinct purposes of various research set-ups and their methodological and ethical consequences (*purpose*),
- the kinds of participation/collaboration (*participants*),
- ways to measure the expected and unexpected short- and long-term effects for the different parties involved (*outcomes*), and

- the different ways to present and process the visual output (*visual outputs*).

The analysis will discuss findings on these aspects against the three goals and outcomes of Photovoice stated above. It concludes by highlighting Photovoice's main achievements and areas that need further attention when applying participatory visual methods to study water governance.

METHODS

This review includes peer-reviewed journal articles published prior to July 2016 which present Photovoice and similar participatory visual research on water issues. Articles have been identified through a three steps search.

First, initial articles were found by searching on scientific databases (Google Scholar, Scopus, ISI Web of Science, Jstor, ProQuest, and Cairn) and academic social networks (Academia.edu and Research Gate) using the following keywords: 'photovoice' OR 'photo voice' OR 'photo story' OR 'photo novella,' OR 'visual methods' AND 'water.' These broad searches resulted in over 2000 items (e.g., books, conference presentations, reports, and articles), that were narrowed down to scholarly, peer-reviewed articles (*n* = 114). These articles were reviewed by looking at title, abstract, and key words in order to identify those that matched two criteria: (1) adopting Photovoice or similar participatory visual methods, and (2) focusing on water as main topic. Articles that simply mentioned water in the title or in the abstract but primarily dealt with related issues like climate change or health were dismissed. This resulted in 18 articles that met the inclusion criteria.

Second, the references of these initial articles were reviewed to identify additional studies matching the two criteria. Five additional articles were discovered through this search.

Third, selected water journals (Water Alternatives, Water Policy, Water Resources Management, Water Research, International Journal of Water resource development, WIREsWater, and Water International), visual studies journals (Visual studies, Visual Communication, Journal of Visual Culture, and Photography & Culture), and journals with specific sections dedicated to visual methods (EchoGeo rubrique 'sur l'image') were searched in their entirety. This last search did not yield any additional study, suggesting that an exhaustive sample had been already assembled through the previous steps.

In spite of searching also French and Italian search engines, journals, and key words, only articles in English were found. Thus, this review is based on 23 articles, pertaining to 20 separate research projects, presented in Table 1.

Consistent with previous reviews of Photovoice,[22,23] articles were analyzed by developing a descriptive coding scheme, which in this case included the following categories: methods, purpose of the study (knowledge building, empowerment, and influencing policy makers), specific objective of the study, participants (number, profile, place, and length of the study), urban/rural, visual outputs, outcomes of the study, gender issues. All text in the articles corresponding to these categories was labeled and transferred to a matrix (streamlined in Table 1) to facilitate an overview of each article, as well as their comparison.

RESULTS

Articles have been grouped according to: (1) water governance themes and concerns addressed, identified under the category 'specific objective of the study,' and (2) geographical focus, identified under the categories 'participants (place)' and 'urban/rural.' The four groups thus identified are:

1. Projects identifying issues and concerns in water and health, sanitation, hygiene (six articles[27–32] and five projects): these studies have been undertaken in Sub-Saharan Africa (South Africa, Mozambique, Kenya, and Tanzania) by researchers based in Canada and the United States with local African partners.
2. Projects promoting participation in water resources management (eight articles[19,33–39] and eight projects), in Australia and New Zeeland undertaken by national research groups, and in India by an international consortium of Australian and Indian researchers.
3. Projects aiming at understanding experiences and perceptions of landscapes and water spaces (five articles[40–44] and four projects): these projects have been undertaken in Canada (2) and Japan (1) by national research groups and in Sierra Leone (1) by a researcher based in Canada.
4. Projects aiming to explore the link between domestic water and urban water management (four articles[20,45–47] and three projects) undertaken in Australia (2) and New Zeeland (1) by national research groups.

This classification highlights the link between specific themes and geographic locations (as shown by the map of Figure 1). For instance, water and sanitation

TABLE 1 | Articles Reviewed

First Author and Year	Article Title	Methods	Purposes	Participants	Visual Outputs	Outcomes
Water and health, sanitation, hygiene						
Badowski, 2011	Understanding household behavioral risk factors for diarrheal disease in Dar es Salaam: a Photovoice community assessment	Photovoice modified with greater presence of authors (i.e., in selecting pictures)	Knowledge building	13 household mothers from 2 peri-urban communities in Dar El Salam, Tanzania	Examples of pictures of water related behavioral practices included in the article	Identification of behavioral practices that perpetuate the transmission of pathogens through contaminated water, and of financial factors that hamper implementation of proper solutions
Bisung, 2015a	Dreaming of toilets: using Photovoice to explore knowledge, attitudes and practices around water–health linkages in rural Kenya	Photovoice	knowledge building, empowerment, reach policy makers	8 women of rural coastal community in Usoma (Lake Victoria), Kenya	Examples of pictures selected by participants for the interviews included as online annex to the article	Identification of socioeconomic factors that become embodied through lack of access to water and sanitation and create barrier to collective action
Bisung, 2015b	Using Photovoice as a community based participatory research tool for changing water, sanitation, and hygiene behaviors in Usoma, Kenya	Photovoice	Knowledge building, empowerment, reach policy makers	8 women of rural coastal community in Usoma (Lake Victoria), Kenya	Not documented	Better understanding of the complexity of water health issues, strong desire among community members to address water and sanitation challenges, examples of activities implemented by community.
Levison, 2012	Using mixed methods to visualize the water-health nexus: identifying problems, searching for solutions	Photovoice and community mapping	knowledge building, educating participants, empowerment, reach policy makers	25 members (F = 17 M = 8) of rural coastal community in Usoma, Lake Victoria, Kenya	Not documented	Better understanding of water and sanitation practices, identification of i) differences between age and gender preferences around water

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TABLE 1 | Continued

First Author and Year	Article Title	Methods	Purposes	Participants	Visual Outputs	Outcomes
						and health, ii) community attributes that can facilitate change
Scorgie, 2016	'Bitten by shyness': menstrual hygiene management, sanitation, and the quest for privacy in South Africa	Photovoice matched with other visual techniques like 'Body mapping'	knowledge building, reach policy makers	7 women in 3 low income communities in Durban, South Africa	Examples of pictures taken by participants presented in the article	Identification of area of concern in the interface between menstrual hygiene and sanitation systems
Virgi, 2011	Picturing policy in addressing water and sanitation: the voices of girls living in abject intergenerational hardship in Mozambique	Photovoice with participants also interviewing their older female relatives	Knowledge building, empowerment, reach policy makers	10 girls (aged 10–14) from a school in peri-urban Maputo, Mozambique	10 pieces of arts and 100 pictures, some photos and stories published in Unicef report	Identification of water and sanitation as areas of girls concern, identification of practical solutions, promotion of girls overall confidence and enthusiasm
Participation in water resources management						
Baldwin, 2012	Bridging troubled waters: applying consensus building techniques to water planning	Photovoice and other consensus building techniques	Knowledge building, reach policy makers	33 participants (irrigators, government, environmental associations) in Lockyer Catchment, Queensland, Australia	Not documented	Participants values clarified and consensus built around common strategies, further negotiation facilitated
Keremane, 2011	Using PhotoStory to capture irrigators' emotions about water policy and sustainable development objectives: a case study in rural Australia	PhotoStory and other qualitative and quantitative methods	Knowledge building, reach policy makers	11 participants (4 irrigators, 6 staff irrigators cooperative, 1 local business) in Coleambally, New South Wales, Australia	Examples of pictures taken by participants included in the article, Photo exhibition and book	Identification of participants values and concerns and communication to the wider community and policy makers
Keremane, 2012	Picturing sustainable water resources management: photo-conversations	PhotoStory and other qualitative and quantitative methods	Knowledge building, reach policy makers	26 participants (70% irrigations, 30% policy makers) in Limeston Coast and Coleambally, Australia	Examples of pictures taken by participants included in the article, Photo exhibition and book	Identification of participants views and emotions, offering a medium to voice concerns

TABLE 1 | Continued

First Author and Year	Article Title	Methods	Purposes	Participants	Visual Outputs	Outcomes
	with irrigators and policymakers					to wider community and policy makers
Kilvington, 2011	Creative platforms for social learning in ICM: the Watershed Talk project	Photo diaries	Knowledge building, reach policy makers	19 participants—identified among people being known as 'thinkers, Mouteka catchment, New Zeland	Participants presenting their pictures in group discussion, project booklet	Shifts in participants views about the catchment and their own role in water management, changes in ideas on networking and problem solving, preparedness for further engagement and action
Maeshwari, 2014	The role of transdisciplinary approach and community participation in village scale groundwater management: insights from Gujarat and Rajasthan, India	Photovoice and other qualitative and quantitative methods	Knowledge building, educate participants, reach policy makers	Local village and school communities in two watersheds in Gujarat and Rajasthan, India	Not documented	Collection of relevant data related on groundwater, reinforced awareness about the need of transdisciplinary methods to address water issues
Maclean, 2013	Photovoice evaluated: an appropriate visual methodology for Aboriginal water resource research	Photovoice	Knowledge building, empower participants, reach policy makers	Two projects: 16 members of Kulu Nyungkal people, Queensland Wet Tropics; 6 members of Nauiyu Nambiyu community, Northern territory, Australia	Examples of pictures taken by participants included in the article to complement narratives, research report shared with community during open day	Photovoice found culturally appropriate to Aboriginal values and knowledge, promoting participants self-empowerment, facilitating communication with non Aboriginal researches, tensions might arise in communicating research (who represent participants? Which is the

(continued overleaf)

TABLE 1 | Continued

First Author and Year	Article Title	Methods	Purposes	Participants	Visual Outputs	Outcomes
						main audience?)
Maclean, 2015	Crossing cultural boundaries: Integrating Indigenous water knowledge into water governance through co-research in the Queensland Wet Tropics, Australia	Photovoice	Knowledge building, empowerment, reach policy makers	16 members of Kulu Nyungkal people, Queensland Wet Tropics, Australia	Examples of pictures taken by participants presented in the article, report (two version, one with culturally sensitive information for internal use)	Report as boundary object facilitated the translation of indigenous knowledge and values in a way that it is understood by nonindigenous planners and scientists
Pierce, 2008	On community capitals as we see them through photovoice: Cowell oyster industry in South Australia	Photovoice and diaries	Knowledge building	7 community members in Cowell, Eyre peninsula, Australia	Examples of pictures taken by participants presented in the article to illustrate the 5 research questions	Identification of participants views and perspectives
Water spaces and landscapes						
Fresque-Baxter, 2013	Participatory photography as a means to explore young people's experiences of water resource change	Participatory photography and classroom based curriculum activities	Knowledge building, educating participants	5 high school students (aged 10–12) in Fort Resolution, Northwest territories, Canada	Students' photo essays, photos used in school activities, stories and photos published in newspaper, 3 stories with pictures presented in the article	Identification and promotion of participants views and concerns; importance of adaptability and flexibility of research methods, visual methods facilitating relationship between school and researcher
Sherren, 2013	What can photo-elicitation tell us about how maritime farmers perceive wetlands as climate changes?	Auto driven photo-elicitation	Knowledge building	20 livestock farmers in Nova Scotia, Canada	Examples of photos and narratives presented in the article	Identification of participants values and perceptions
Thompson, 2009	'I am a farmer': young women address conservation using Photovoice around Tiwai Island, Sierra Leone	Photovoice	Knowledge building, empowerment	7 young women farmer aged 16–36 in Tiwai Island, Sierra Leone	Examples of pictures taken by participants to illustrate a poem (visual abstract)	Identification and expression of participants views and concerns

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TABLE 1 | Continued

First Author and Year	Article Title	Methods	Purposes	Participants	Visual Outputs	Outcomes
Thompson, 2011	Picturing gendered water spaces: a textual approach to water in rural Sierra Leone	Photovoice	Knowledge building, empowering participants	28 farmers, women and men, in Tiwai Island, Sierra Leone	Examples of pictures taken by participants presented in the article	Identification of participants views and concerns, understanding of the complexity of gendered nature of water and its socioeconomic causes
Yamashita, 2002	Perception and evaluation of water in landscape: use of photo-projective method to compare child and adult residents' perceptions of a Japanese river environment	Photo-projective method (taking photos and recording verbal and written narratives about them)	Knowledge building	46 adults and 49 children of the rural town of Tanushimaro, Kyushu area, Japan	Examples of pictures taken by participants presented to portray different views adult/children	Identification of differences in participants views and perception of water
Domestic water and urban water management						
Allon, 2006	Everyday water: cultures in transition	Water diaries, photo elicitation, auto driven photo elicitation, questionnaire	Knowledge building	25 participants in a new housing settlement in Western Sydney, Australia	Not documented	Identification of participants views, practices, aspirations and incentives to support social change
Golder, 2013	Writing and photographing 'little water'	Photo diaries and water diaries	Knowledge building	11 households (total 29 participants) in Auckland city, New Zeeland	Examples of pictures taken by participants included in the article to complement narratives	Visual methods made talking and writing about water easier and facilitated growing awareness and construction of narratives about everyday waters
Keremane, 2014	The emotional connection to urban water through the lens of the water customer: a photostory exercise in metropolitan Adelaide	PhotoStory	Knowledge building	8 participants from different suburbs in Adelaide, Australia	Examples of pictures taken by participants included in the article to complement narratives	Identification of participants emotions, values and views on water policies, creation of a space to look, listen and learn

TABLE 1 | Continued

First Author and Year	Article Title	Methods	Purposes	Participants	Visual Outputs	Outcomes
						from the community
Wu, 2016	Sustainable urban water management through the lens of community—a photostory exercise in metropolitan Adelaide	PhotoStory and other quantitative and qualitative methods	Knowledge building	8 participants from different suburbs in Adelaide, Australia	Examples of pictures taken by participants included in the article to complement narratives	Identification of participants emotions, values, views on water policies, link between individual action and urban water flows

issues are studied through Photovoice only in Sub-Saharan Africa, while participatory visual methods are applied to the study of indigenous water resources management and to the study of domestic urban water mostly in Australia and New Zealand.

Methods Used in the Reviewed Articles

Participatory visual research appears to facilitate connections. First of all among people and institutions: all projects but one are presented in coauthored articles, being the outcome of collective research by national or international consortia. Visual methods are also reported as facilitating the partnership between researchers and nonacademic organizations such as NGOs, international institutions, local associations, or schools.[40]

Second, visual techniques are often used in combination with more traditional quantitative or qualitative methods such as interviews, questionnaires or surveys, in the framework of broader research projects (13 cases). Half of the projects reported to use Photovoice (9 cases). Six other studies adopted a technique referred to as photo diaries or Photo-Story, which involves taking pictures and writing associated comments in a diary. One project adopted a method alike Photovoice, referring to it as 'participatory photography.'[40] Another one used the Photo Projective method, 'which asks residents to take pictures of their environment and record their descriptions of each scene on site.'[44] Finally, one study qualified its method as 'photo-elicitation' because it used the same technique of Photovoice but only in a one-off engagement with participants.[41] The two last studies have been included in the review because they use visual material generated by respondents to elicit information, in spite of not involving them in iterative participatory research. In fact similar low participation studies, where researchers tend to have minimal interaction with participants have been included in other reviews about Photovoice too.[23]

Purposes

Participatory visual research methods like Photovoice can have different purposes along a continuum going from the scientific goal of generating new knowledge—both about the method itself and the situations where it is used—to the more practical and political goals of supporting local groups in documenting and transforming social realities. In between stand the goals of educating and/or empowering participants. These purposes are not necessarily exclusive and often coexist within the same project.[21]

Since they present their research in academic journals, all articles had 'knowledge building' on water governance issues among their main purposes. In addition, almost all research on water, health, and sanitation, as well those on water resource management, included 'reaching policy makers' among their goals. Research on water, health, and sanitation also add empowerment purposes, associated with gender.[32] This is also the case in Thompson's study of water spaces in Sierra Leone.[43] Beside these cases—and a quick mention in Maeshwari[36]—gender does not emerge as focus of any of the other studies. Empowering local or indigenous groups—and also researchers—in gathering information and presenting their knowledge is a purpose shared by several studies on water, sanitation and health, as well as on participation in water resource management.[29,30,34,37,38]

FIGURE 1 | Themes and locations of the reviewed studies.

While Photovoice has been widely used to engage with students and schools, only three projects explicitly mentioned educating the participants among their goals; two of those projects directly involved schools and students.[36,40] Virgi also involved a school in Mozambique, 'interested in the issues that the girls themselves would identify'[32] but without explicit educational goals.

Research on water and landscapes and on domestic urban water aims exclusively for knowledge production. It is worth highlighting that some of the articles refer only to the visual research component—aiming at generating knowledge—of wider projects. These projects might entail additional goals of informing and influencing policy making, which are sometimes mentioned but not discussed in the articles reviewed here. Generally while the production of knowledge through Photovoice is extensively documented and discussed, other purposes such as empowering participants and reaching policy makers are presented in a more elusive way.

Participants

By definition Photovoice targets participants identified as vulnerable or subaltern. This is the case in nearly half of the projects (9), involving indigenous groups, women, girls, youth, or urban dwellers living in low income suburbs. Photovoice is described as 'culturally appropriate' and 'engaging visual methodology tool' especially when working with indigenous populations[37] or vulnerable groups.[29] Similar considerations apply to groups like farmers or students targeted by other projects, whose voices are equally considered not to be sufficiently heard in public debates and by policy makers.

The majority of the studies here reviewed targeted homogeneous groups of participants. However six projects recorded and compared the perspective of different actors, e.g., irrigators and policy makers,[19,33,34] children and adults,[44] men and women.[30]

The number of participants in the projects ranged from 5 to 95, with an average of 18, depending on the length of the involvement of the researchers with local communities and the commitment requested from participants. Project using Photovoice handed the camera to participants for 1 or 2 weeks, while Photo Story and photo diaries project lasted from 1 to 4 months. Particularly in the latter, the commitment and efforts requested have been reported as the main obstacle to recruit and keep participants in the research.[19,20,47] Participatory

visual research's high time demand also complicates its use together with other techniques on hot issues requesting rapid actions such as water conflicts.[33] Some projects overcame the challenge of high time demand for participants and achieved rewarding empowerment outcomes in terms of public outreach by working closely with local institutions such as school[32] or with local associations motivated by the fact that the research addressed the issues of their primary concern.[33,37,38]

Outcomes

All projects emphasize the potential of visual research in terms of generating knowledge because it allows to identify and explore participants' views, emotions, practices, and aspirations. In this respect, Photovoice facilitated to highlight the complexity of water issues, by revealing the consequences of power relations linked to socioeconomic factors[27,29] or gender.[43] Participatory visual research also elicited reflections and awareness about the need for a holistic approach in water-health interventions to address political, ecological and social (micro and macro) factors,[27,28] as well as the need for transdisciplinary work to address such complexity.[36]

A second reported effect of participatory visual methods is facilitating interactions and connections. Photovoice allowed to equalize the status of participants,[35] e.g., translating the language of indigenous knowledge to planners and policy makers,[38] or facilitating communication between the researcher and students[40] or making writing and talking about water easier for participants.[46]

A third effect pertains to the dimension of transformation. Visual methods facilitated awareness raising on the topic addressed,[46] a shift in participants' perceptions, views and attitudes,[35] the empowerment of participants by building their overall confidence and enthusiasm,[32] the identification of factors and incentives to support behavioral change[29] and of potential solutions to the problem addressed.

In spite of several articles reporting among the outcome of Photovoice the creation of a space to empower participants and communicate their concerns and identified solutions, there is a general lack of documentation (indicators, data, photos, etc.) and reflection about those spaces and their real impact in terms of social change.

Visual Outputs

How did projects use and display photos taken by research participants? All articles describe the use of pictures to elicit interviews or group discussions, with 14 of them including examples of photos taken by participants to illustrate the research's main findings. In these articles, pictures are mainly used to illustrate outcomes related to knowledge production, in particular about participants' views and concerns identified (Figure 2). Only two articles—referring to the same project—included pictures related to the relational aspects of the research, namely the interaction between participants, researchers, and policy makers.[37,38] This project considers photos as a 'boundary object'[38] facilitating the understanding of indigenous knowledge by nonindigenous planners and researcher. The latter is identified as 'translator and re-presenter of outcomes to policy makers'.[37]

Only two projects reported about the public display of photos at the end of the research, either through a photo exhibition and a book[19,34] or the sharing of photos and story as a display banner during a community open day.[38] In two other cases, participants' photos and stories have been reproduced in a Unicef report[32] or in a local newspaper.[40] In five projects, the visual outputs and their dissemination were not visually documented at all. This appears particularly surprising given the fact that four of those projects included reaching out policy makers among their goals, and that the public display of photos is considered one of Photovoice key dissemination tool. One of the reasons for this finding might be related to the limits of this review, which takes into

FIGURE 2 | An example of picture illustrating participants' views and concerns. 'So the important rule [is that] we take great care of the pump because we get clean water as a whole community.' Credits: James Gbomgbotoh, Kambama. Source: Thompson.[43]

FIGURE 3 | An example of picture recording emotions associated to water. 'Even though the dead trees in the picture were not caused by lack of water (rather rising salinity) the desolate landscape that they present emphasizes the lack of hope that can be held by farmers when they have to look at the view everyday.' Source: Keremane.[19]

FIGURE 4 | An example of picture linking participants' feeling with infrastructures. Exterior view of a "Ventilated Pit Latrine"(VIP) in Dassenveld (South Africa). The pipe on the left of the structures helps to remove odor from inside the latrine. "That's the toilet, this is the outside...there is no lock." Credits: 34 year old woman, Photovoice project, Source: Scorgie.

account only academic peer reviewed articles. Photovoice visual outputs and end products are often nonscientific contributions (video, exhibitions, books, catalogues, and posters) presented in media and spaces other than academic journals. However, the lack of any reference and documentation in the reviewed articles of such nonscientific contributions suggests the idea that when it comes to water governance, Photovoice potential in terms of outreach and dissemination remains untapped.

ANALYSIS

The results of the review are here analyzed in light of Photovoice three main goals: to record and reflect strengths and concerns of participants' communities, to promote critical dialogue and knowledge, and to reach policymakers.

Visualizing the Hydrosocial Cycle and Water Universal Meanings

Participatory visual methods facilitated participants to 'think above water,' raising awareness about water in everyday life.[46] Researchers report that they proved effective in recording and reflecting participants' views and emotions, highlighting affective, identity, spiritual and sensory values associated to water[19,20,34,47](Figure 3). These methods provide visual representation of 'insider views' of everyday life experiences and community activity,[32] often on intimate issues and dimensions of water experiences which otherwise might not have been captured with more traditional methods.[30]

In addition, taking and commenting pictures facilitated a multidimensional understanding of everyday water,[46] linking participants' feelings and emotions with natural spaces (rivers, ponds, etc.),[43] material infrastructures (latrines, canals, etc.),[31] and sociotechnical systems (urban water services).[47] The majority of the articles facilitate the visualization of this links by presenting examples of pictures taken by participants to complement their narratives (Figure 4). Thus, visual research appears particularly meaningful for research aiming at integrating biophysical and social process[35,45] to address the so called hydrosocial cycle.[48]

The projects reviewed involved different types of communities, both in high and low income countries, internally diverse in terms of gender, generation, and socioeconomic background. This appears to indicate that Photovoice should not be considered exclusively a method tuned to work with vulnerable groups whose 'exotic' esthetics, 'traditional' knowledge, or 'unfamiliar' practices would request less conventional methods to be captured. Rather the fact that Photovoice has been equally applied to groups which might not be qualifies as subalterns—such as irrigators, urban dwellers in industrialized countries or even government representatives—suggests that visual methods can effectively reflect water's 'universal meanings.'[5]

Facilitating Dialogue on Water Conflicts

Beside recording and reflecting on participants' views and concerns, Photovoice aims to facilitate both the

communication of those views to other actors, and collaborative learning. Participatory visual methods were reported as facilitating communication, dialogue, and building relationships both between participants and the researchers,[34,38,40,46] and between different categories of participants, such as irrigators, policy makers, and environmentalists.[19,33,34] In some cases, such a dialogue reinforced participants' identities and 'collective social cohesion of the wider communities' like in the case of the Aboriginal communities that took part and co-authored Maclean's research.[37,38] In other cases, it resulted in 'fostered understanding and dialogue between parties with fundamentally different views' by facilitating listening and mediation.[33] Baldwin presents an interesting case in which Photovoice has been used, together with other techniques, to build consensus around water allocation plans in Australia. In this case, visualization facilitated helping in clarifying values, better information sharing, exploring and recognizing views, conflict assessment, identifying divergences on which to focus, reframing, and finding common ground.[33] Involving different stakeholders as research participants appears to facilitate dialogue.[19,33,34] This might also create a space for direct communication between different groups, overcoming the concern of Maclean, who points at the risk of disempowering participants when the researcher represents their voice in front of policy makers, rather than letting them speak for themselves.[38]

Two studies (Refs 19, 33 and 34) identify concerns over water allocation and building consensus on water planning. This suggests that participatory visual research could be an effective tool to address the growing concerns over water scarcity and to facilitate mediating the related disputes and conflicts that might arise between different water users, at different scales, both local and international. In these endeavors, Photovoice effects in terms of reinforcing community belongings and understanding others' perspectives need to be carefully balanced and more thoroughly evaluated. Similarly, trade off and choices have to be made in selecting the audiences targeted when communicating Photovoice results. The styles and codes more suitable to communicate with local communities might not be equally appropriated to interact with policy makers, for instance in terms of lexicon, or informality of the setting.[37]

Reaching Policy Makers?

Most of the studies here reviewed included influencing policy makers among their objectives. Many considered visual methods an effective technique to support this goal, presenting them as 'critical component of policy dialogue'[32] creating a 'window of opportunity to communicate to the wider community and policy makers.'[19,34] The limits of Photovoice in changing prevailing governance paradigms[38] as well as and in documenting its very impact in terms of social change[46] are acknowledged too.

Several of these studies were undertaken in the framework of larger projects addressing water governance issues and implemented in partnership with international organizations, NGOs, or local institutions. These partnerships are identified as instrumental to ensure the link between researchers and policy makers,[30] but are hardly described in the articles.

Bisung provides anecdotic description of initiatives undertaken by the community following the research—completion of a water and sanitation block and increased participation to local WASH committee—but without a systematic analysis.[29] Baldwin and Maclean reflect on the process of involving policy makers in the research or sharing its outcomes with them, as well as on the delicate role of the researcher as broker and translator within this process.[33,37,38] Kilvington appears to offer a more thorough analysis, describing tools to assess outcomes, benefits of visual methods, and shifting views and practices in individual and collective reflection and problem solving in integrated catchment management.[35]

Beside these few references, the process of reaching policy makers and the related outcomes, as well as the impact of the knowledge produced in terms of social change are hardly documented in the articles. While Photovoice is claimed to be an effective method to give voices to participants and to allow these voices to be heard by the wider community and policy makers, the great majority of the reviewed studies fail to support these claims with empirical evidence and adequate documentation, in line with a general trend in participatory visual research.[21] Two studies recall that Photovoice can be used also as a tool to evaluate projects, but fail in applying it for this purpose.[29,35] More broadly, in spite of aiming at reaching policy makers, the great majority of the reviewed studies offer very limited or none information about the political contexts and the power relations shaping—or shaped by—water governance that they aim at influencing.

CONCLUSION

As a contribution to inform future research, I will return to the initial definition of water governance to highlight the added value of participatory visual

methods in its study, as well as the area that need further exploration.

The review has highlighted two main achievements of participatory visual research on water governance. First, the articles document—also visually—the potential of Photovoice in terms of generating knowledge about the 'distribution of water,' as well as on eliciting emotions, values, and concerns on these issues. They also show the potential of linking emotions, values and concerns to natural spaces and technical systems, suggesting thus that visual methods can be meaningfully adopted in research inspired by the hydrosocial cycle approach.

Second, in terms of 'distribution of voice,' participatory visual methods are reported to facilitate the dialogue between different actors involved in or affected by water governance processes. These effects are well documented particularly in the studies involving different typologies of groups or stakeholders as research participants, or in those openly reflecting on the role of the researcher in this process. By virtue of these features, participatory visual research appears a meaningful technique to address contentious topics such as conflicts over water access or distribution.

In relation to these achievements, two issues could be further explored. First, Photovoice potential in terms of addressing gender issues has been exploited so far only in research on water, sanitation, and health in Sub-Saharan Africa. The contribution of participatory visual methods to study the gender dimension of water resources management, domestic and urban water governance, and perceptions of landscapes or waterscapes deserves further study. Second, the articles emphasize the role of participatory visual research in facilitating connections, not only between the natural, social, and technical dimension of water governances, but also between different people: the researcher and participants, different groups of participants, participants and policymakers. An issue that might be further explored is whether and how visualization

facilitates also the connection between different disciplines, supporting inter or trans-disciplinary work.

On the other side, the review also points at a main knowledge gap, which is related to the problematic of political participation in water governance and 'the linkages between the distribution of water and the distribution of voice.' While articles document how participatory visual methods might give voice to subaltern groups in the production of knowledge, it is not clear whether and how they support those groups in achieving immediate and tangible impact on their social, political, and ecological environments. In other words, Photovoice attributes in terms of empowering participants, reaching policy makers and triggering social change often appear taken for granted. An adequate analysis of the political context and the power relation in which the research is embedded, as well as tools and framework to monitor the interaction with policy makers and its outcomes are lacking in the great majority of the articles here reviewed. Thus, when it comes to water governance, further research is badly needed to assess Photovoice promises in terms of reaching policy makers and fostering social change. This also implies tracking visual outputs and end products that are nonscientific contributions and that might be disseminated through grey literature, civic events or artistic performances. Such research appears particularly compelling in light of an utilitarian consideration and a moral imperative: first, research funding agencies increasingly call on science to make and measure impact on societal issues; and second, when involving subaltern or already disadvantaged groups in lengthy participatory projects, researchers should do their best to ensure that all conditions are in place to achieve the expected outcomes and benefits.

ENDNOTES

[a] See for instance the website http://www.hydrocitizens.com that aims at tacking these initiatives.

FURTHER READING

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