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The Uneven Waters of Accra and the concept of Environmental Justice

Towards new pathways of analyzing water inequalities

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Abstract

This working paper outlines analytical pathways that could contribute to deepening the understanding of water inequalities in cities of the Global South. It brings together the status quo of research on water inequalities in Accra, the capital of Ghana, and studies on Environmental Justice. In doing so, it argues for the need to analytically distinguish between the terms '(in)equality' and '(in)justice'. Studying everyday water practices and perspectives on water (in)justice of different stakeholders would be a suitable entry point for an in-depth ethnographic study that analytically separates water inequalities and water injustices but considers their interlinkages. The working paper is based on a literature review conducted in 2015 in the scope of the WaterPower project.

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1 Introduction

The recent report on the progress on sanitation and drinking water published by the World Health Organization and Unicef states that 748 million people did not have access to improved drinking water[1] in 2012, pointing out that about 43% of those lived in sub-Saharan Africa (WHO/ UNICEF, 2014). The report states that urban dwellers tend to have better access to improved water supply compared with their rural counterparts. However, the report also acknowledges "intra-urban disparities" in access to water (ibid, p. 29).[2] The latter is at the center of this working paper.

Yet, 'access to water' has to be put in plural: In many cities of the Global South the water supply of the official water utility is fragmented as the pipe water network covers only part of the city area and the supply is irregular (Cheng, 2014; Kjellen, 2000; Matsinhe, Juízo, Macheve, & Santos, 2008). Thus, the official water supply is "co-produced" (Ahlers, Cleaver, Rusca, & Schwartz, 2014) by multiple private water providers and by self-supply techniques. Consequently, different water**s** flow within the city and there are different modalities to accessing these waters. This situation is apparent in Accra, the capital of Ghana, the case study on which this working paper is based.

Based on the case study of Accra and its Greater Metropolitan Area (GAMA), this working paper seeks to outline analytical pathways that could contribute to deepen the understanding of water inequalities in cities that are characterized by a fragmented and co-produced water supply system. For this endeavor, a twofold approach will follow: Firstly, the status quo of the scholarly literature that addresses inequalities in access to water in Accra is presented and limits of these studies are identified. This is followed by a theoretical discussion of the terms '(in)equality' and '(in)justices' within the concept of Environmental Justice (EJ). The concept of EJ is a promising concept to address water inequalities and injustices, since it gives particular attention to the question who is exposed to environmental burdens and who enjoys environmental goods. In addition, latter EJ-studies go beyond a mere illumination of the (statistical) relations between environmental burdens or goods and social groups but analyze the production of these patterns (Morello-Frosch, 2002). This is particularly true for recent studies on water justice (Joy, Kulkarni, Roth, & Zwarteveen, 2014; Roth, Zwarteveen, Joy, & Kulkarni, 2014; Williams & Mawdsley, 2006; Zwarteveen & Boelens, 2014). Yet, the paper argues that even though (in)justice and (in)equality are linked ideas, they are two different concepts. Inequality refers to the structural phenomena that

[1] The WHO does not only consider piped water (inside the house or in the yard) but also water from public taps or standpipes, tube wells or boreholes, protected dug wells and springs, as well as from rainwater collections as improved drinking water sources (WHO/ UNICEF (2014)).

[2] The term 'disparity' is used in this working paper synonymously with the term 'inequality'. For a discussion of terms such as 'heterogeneities/ (differences)', 'inequality/ (disparities)', and 'injustices/ (inequity)' see the section on Environmental Justice.

people, belonging to a social category such as class or gender, do have different types and means of access to resources which position people in a favorable or disadvantaged position (Solga, Powell, & Berger, 2009, p. 15). In contrast, (in)justice is a normative concept. Distributional justice describes, for instance, what a just allocation of resources should look like.

The two concepts '(in)justice' and '(in)equality' are interlinked since ideas of (distributive) justice are essential, whether inequalities are perceived as legitimate or scandalized as inequalities (Diewald & Faist, 2011; Solga et al., 2009). The latter contributes to the fact that the terms are sometimes used in an overlapping or even interchangeable sense. This is also true for the concept of EJ where the terms '(in)justice' and '(in)equality' are sometimes conflated (Pellow, 2000). Indeed, scholars within the EJ-concept seem to implicitly refer to the observation of inequalities in distribution of environmental goods or bads as an injustice. Yet, a clear distinction between the terms '(in)equality' and '(in)justice' would not only enhance the analytical value of the EJ concept but could also contribute to enhancing the knowledge of water inequalities and injustices in Accra. In fact, with such an analytical distinction justice can also become a question for empirical analysis in itself. The focus would then not be on the researcher's position, with regard to justice, but would lie on the understanding of justice of those people who experienced environmental inequalities.

This working paper is organized in three main sections. The first section gives an overview of the literature on inequalities in access to waters in Accra. In the second section, the concept of EJ is introduced and discussed in relation to the terms 'justice' and 'inequality'. This discussion is based on the different ideas of justice that have been conceptualized within Philosophy and the conceptualization of inequality within Sociology. The last section outlines the analytical pathways that could deepen the understanding of water inequalities and injustice in Accra, and in cities of the Global South in general.

2 The Uneven Waters of Accra

Although Ghana has abundant water resources, only about half of the population in Accra and its Greater Metropolitan Area (GAMA) has direct access to piped water from the public water utility Ghana Water Company Limited (GWCL).[3] Moreover, even dwellers with a pipe connection do not have a guaranteed regular water flow since interruptions in water supply continue to occur as a result of pipe water rationing (Stoler et al., 2012). Indeed, piped water flows only on certain days per week and certain hours of the day, depending on spatial factors (Peloso & Morinville, 2014; Stoler et al., 2012; see

[3] While there are inconsistent numbers on the piped water coverage available, they all point to the fact that roughly half of the urban population in GAMA has access to piped water. Adank, Darteh, Moriarty, and Osei (2011, V) refers to 51%, van Rooijen, Spalthoff, and Raschid-Sally (2008, p. 262) to 45%, Peloso and Morinville (2014, p. 121) state that GWCL meets only about 60% of the total water demands.

figure 1 in the appendix). Due to the erratic and unreliable piped water supply, water storage facilities become essential (Ainuso, 2010; Peloso & Morinville, 2014). In the light of a limited water supply from the official water network, multiple private water providers have emerged in GAMA (Adank et al., 2011). Water tankers, for instance, serve areas where piped water does not flow. In addition, other private persons sell smaller quantities of groundwater from their private wells, retail water from tankers or from their private piped water connection to neighbors. Non-Governmental Organizations (NGOs) have tried to assist by establishing decentralized water kiosks where water is treated and sold in buckets within a particular community (Adank et al., 2011). Urban dwellers in Accra also resort to self-supply systems such as harvesting rainwater or directly accessing groundwater through a private well or borehole (Adank et al., 2011). Drinking water is commonly sold in 500 ml sealed plastic bags called sachets and sold by private water vendors basically everywhere in the city (Stoler, 2013).

Three classes of water consumers have been identified: i) those who have uninterrupted access to piped water (which is the privileged minority), ii) those who have a piped water connection but with frequent interruptions in flow so that the water needs have to be supplemented through private water providers and iii) those who are totally dependent on private water providers because they do not have a piped water connection (Amankwaa, Owusu, Owusu, & Eshun, 2014). In general, it is emphasized that the coverage of piped water in low-income neighborhoods is significantly lower than in high-income areas (Ainuso, 2010; Amankwaa et al., 2014; Obeng-Odoom, 2012; Stoler et al., 2012). Thus, particularly poor urban dwellers have to resort to private water providers (Ainuso, 2010; Amankwaa et al., 2014; van Rooijen et al., 2008).[4]

Despite the fact that private water providers serve for the water needs of poor urban dwellers, scholars have emphasized that by relying on their services, poor urban dwellers are also exposed to the drawbacks of private providers. In particular, the higher unit price of water from private providers and health-related risks that are associated with water from private providers have widely been highlighted (Ainuso, 2010; Amankwaa et al., 2014; Obeng-Odoom, 2012; van Rooijen et al., 2008). Poor urban dwellers have to pay water prices around three to twenty times higher than those prices set by public

[4] Yet, if poor urban households do have direct access to piped water, they are more affected by the erratic piped water supply than richer dwellers. The former are mostly not able to pay for large water storage containers (so called poly tanks), to store water in times when the pipe water flows and to use the storage water during the regular interruptions of the pipe water flow (Peloso and Morinville (2014).

providers.[5] Private water vendors are not regulated by the Public Utility Regulatory Commission (PURC) and thus the price of water is freely determined by market forces (Ainuso, 2010; Amankwaa et al., 2014; Peloso & Morinville, 2014; Stoler et al., 2012; van Rooijen et al., 2008). Hence, prices are dependent, for instance, on water availability, which in turn depends on the season and on the flow of water in the network (Ainuso, 2010). Yet, Peloso and Morinville (2014) point out that residents of a poor urban neighborhood perceive the water prices set by private water providers as "fairly knowable and manageable" (Peloso & Morinville, 2014, p. 130). In addition, Stoler (2013, p. 187) highlights that the burden to fetch water is perceived by low-income households as more cumbersome than the cost involved.

Nevertheless, in the case of low-income households, health risks may arise from the habit of using less or reusing water to conserve water in light of the high prices set by private water providers (Amankwaa et al., 2014, p. 80). Apart from this water price related impacts on water use and related health risk, the customers of private water providers are exposed to health risks due to the quality of the water provided and the risk of pollution during storage (Ainuso, 2010). For instance, the sources from which private water providers get their water are often dubious; without the possibility to check the quality of the water, it is difficult to know whether the water was sourced from piped water provided by the official water utility or untreated surface water (Ainuso, 2010). In addition, storage tanks are often not cleaned on a regular basis (Ainuso, 2010; Obeng-Odoom, 2012). Water storages in households also raise health issues as buckets are used which are commonly worn-out and without lids (Amankwaa et al., 2014).

With regards to the quality of sachet water, study results are conflicting (Osei, Newman, Mingle, Ayeh-Kumi, & Kwasi, 2013; Stoler, 2014). Urban dwellers perceive the water quality of sachet water, which is commonly referred to as "pure water", as higher compared to tap water (Stoler et al., 2012; Stoler, 2013; Stoler, Tutu, & Winslow, 2015). Stoler and colleagues (Stoler et al., 2012; Stoler, 2013; Stoler et al., 2015) have intensively studied the phenomena of sachet water in Accra. Sachet water has increasingly become an alternative drinking water source in the city. Similarly, as reported for other private water providers (i.e. water tankers and neighborhood water vendors), Stoler et al. (2012) found in their study that particularly poor urban dwellers resort to sachet water for drinking purposes. In addition, the authors highlight that the water rationing scheme rolled out by the GWCL affect the consumption of sachet water. In fact, sachet water consumption is linked to a high degree of piped water rationing within a particular neighborhood (ibid.). Yet, in a recent study conducted in a low-income neighborhood, Stoler

[5] Ainuso (2010) states that those who rely on private water vendors pay three or four times more than the customers of Ghana GWCL, who enjoy piped water, van Rooijen et al. (2008) speaks of up to eight times, Obeng-Odoom (2012) refers to about 12 times, and Amankwaa, Owusu, Owusu, and Eshun (2014) mentions three to 20 times.

et al. (2015) show that sachet water is consumed even though there is access to piped water. In addition, not only poor urban dwellers consume sachet water but also those who are financially well-off. This goes along with the result that consumers mainly resort to sachet water because it is convenient and not primarily because there is no other drinking water option available (Stoler et al., 2015). Thus, while at the beginning of the sachet water production particularly poor urban dwellers resorted to sachet water, it has increasingly become a favorable drinking water access modality of all social classes.

Nonetheless, sachet water consumption remains contradictory: While the unit cost of sachet water is higher than that of piped water from the official water utility (GWCL), the use of sachet water reduces health risks associated with water which is poorly stored in open buckets (Stoler, 2013). Stoler et al. (2012) show that the use of sachet water within low-income neighborhoods has a protective effect against child diarrhea. However, the empty plastic sachets pollute the streets and choke the open drains of Accra. The latter creates numerous health related risks and problems (Stoler et al., 2012; Stoler, 2013).

The available literature on inequalities in accessing water in Accra is limited to the study of low-income neighborhoods and poor urban dwellers. The water situation in high-income neighborhoods attracts rather little attention within scholarly literature even though high-income neighborhoods with a pipe connection may experience regular interruptions in the flow of water and therefore may depend on private water providers as well. In addition, Stoler (2013, p. 188) emphasizes that low-density middle-class settlements located at the peri-urban fringes also rely on private water providers or their own wells to access water. If solely poor urban neighborhoods are studied in order to illustrate inequalities in accessing waters in Accra, a bias exists in the analysis.

Moreover, most of the scholarly literature focuses in particular on inequalities for (poor) urban dwellers that are exposed to different disadvantages (i.e. health risk, higher water prices) by resorting to private water providers (Ainuso, 2010; Amankwaa et al., 2014; van Rooijen et al., 2008). Advantages of private water providers are rather neglected within the literature. An exemption is the work of Peloso and Morinville (2014), who studied in particular the ability of poor urban dwellers to navigate through a fragmented and co-produced water supply system by employing various adaptation strategies. With this approach, Peloso and Morinville (2014) are not only capable of showing the active role of poor urban dwellers in securing their water needs but also of illuminating the advantages private water providers can hold for poor urban dwellers. The authors illustrate, for instance, that even though the water price of private water providers is higher compared to the price of the official water utility, poor urban dwellers prefer the “pay as you fetch” system of private water providers. The post-use paying system through monthly water bills, as employed by the official water utility, holds the risk of accruing debt to the GWCL (Peloso & Morinville, 2014, p. 131).

This demonstrates that an in-depth analysis is needed to understand the advantages and disadvantages of private water providers for different social groups. The discussed studies illuminate water inequalities that are related to the proximate dimension of water access, such as the affordability of water or water quality and related health risks (Ranganathan & Balazs, 2015). These are important results, yet they are limited since they do not address how these water inequalities are produced. For such an analysis a processual understanding of water access would be helpful. In such an analysis, focus is placed on the history, discursive construction, and politics that underpin uneven access patterns (Ranganathan & Balazs, 2015). In the next section, the EJ-concept is introduced, whereby particular focus lies on the conceptualization of the terms '(in)equality' and '(in)justice'.

3 Environmental Justice

The normative concept of Environmental Justice (EJ) emerged out of a group of movements in the United Stated (US) in the 1970s and 1980s. These grassroots movements called attention to the observation that toxic sites are primarily located in poor, racial minority communities (Bullard, 1994). The 1987 published report by the Commission for Racial Justice of the United Church of Christ (UCC) is the formative study in the field of EJ (Foster, 1993). The report documents the distribution of commercial hazardous waste sites across the US and claims that those facilities are disproportionally located in communities of color (United Church of Christ, Commission for Racial Justice, 1987). This report has inducted an enormous number of studies that investigate the linkages between race, class, and the location of environmental burdens. By assessing statistical evidence between these relations, these early studies were mainly quantitative in their approach (Bullard, 1994; Cutter & Solecki, 2013).

Besides the term 'environmental justice', the concept of 'environmental racism' is used within EJ-studies. The latter term was coined by the then Executive Director of the UCC, Dr. Benjamin Chavis, in order to describe the above mentioned patterns and relations (Foster, 1993). Yet, 'environmental racism' assumed intentional discrimination, whereby the term 'environmental justice' includes the normative vision of justice. However, it has been debated whether minority communities were actually targeted intentionally by locating toxic waste dumps close to their living environment and therefore if one can speak of discriminatory intent, or whether minority groups were rather somehow forced to move into already polluted neighborhoods (Pulido, 1996). Therefore, a focus on intent-based discrimination is too narrow since it over-simplifies the causes of "inequalities" by neglecting "institutional mechanisms as well as historical and structural processes" that shape "environmental inequalities" (Morello-Frosch, 2002, p. 491).

The focus on (statistical) relations between race, class, and the location of environmental burdens of early EJ-studies was not only criticized internally but was also a major point of criticism by other scholars. Scholars of Political

Ecology, which have also studied environmental injustices and inequalities, clearly distinguish their approach from EJ-studies (Swyngedouw & Cook, 2009; Swyngedouw & Heynen, 2003). (Urban) Political Ecology scholars focus on the processes that are producing uneven urban environments, whereby environmental justice studies focus more on the socio-spatial patterns of environmental burdens and benefits (Swyngedouw, Cook 2009). Swyngedouw and Heynen (2003, p. 910) acknowledge that "environmental justice studies" (EJS) are often "sensitive to the centrality of social, political and economic power relations in shaping processes of uneven socioecological conditions", they emphasize that EJS "often fail to grasp how these relationships are integral to the functioning of a capitalist political-economic system". Swyngedouw and Heynen (2003) observe the embedding of EJ in political practices, as opposed to a theoretically driven approach of (Urban) Political Ecology, as the root cause of this different focus of EJ scholars. Yet, this criticism may apply only to early EJ-studies and not necessarily to the emerging trend of more political EJ-studies (Ranganathan & Balazs, 2015). Recently, the EJ-concept has also been critically employed by scholars who analyze "water justice" with different entry points in the Global South (Debbané & Keil, 2004; Dill & Crow, 2014; Joy et al., 2014; Mehta, Allouche, Nicol, & Walnycki, 2014; Movik, 2014; Udas, Roth, & Zwarteveen, 2014).

3.1 (In)justice and (In)equality in Environmental Justice Studies

Studies on EJ draw attention to injustices in relation to environmental issues by analyzing who, and through which root causes, is affected by environmental burdens and who enjoys environmental benefits. In this regard, the concept seems well suited to studying inequalities in access to water, if access to (safe) water is conceptualized as an environmental benefit. However, there are inherent flaws within the EJ-concept that need to be noted: Within the EJ-concept, the terms (in)justice and (in)equality are sometimes used interchangeably (Pellow, 2000). In general terms, EJ-scholars study the relevance of heterogeneity-characteristics such as class, race or gender for the distribution of environmental bads and goods. Thus, EJ-scholars study primarily environmental inequalities, but they often do not explicitly note that they analyze environmental inequality but they also valuate the illuminated uneven patterns as environmental injustices.

Indeed, inequalities in access to environmental goods as well as exposure to environmental hazards are implicitly regarded as injustices. For instance, Morello-Frosch (2002) continuously employs the term 'environmental inequality', whereas other EJ scholars apply the term 'environmental justice'. Morello-Frosch (2002) states that within EJ, different terms are applied to describe environmental justice patterns. However, the author does not elaborate on possible different understandings of the term EJ as employed by scholars. In particular, she does not stress why she applies 'environmental inequality' instead of 'environmental justice' – which could thus be interpreted as a random choice. Similar to the overall EJ approach, most of the studies that particularly address water justice, equate inequalities in access

to water with water (in)justices (Debbané & Keil, 2004; Dill & Crow, 2014; Mehta et al., 2014; Udas et al., 2014).

Recently, Schlosberg (2003, 2004, 2007) has elaborated on the term 'justice' within the concept of EJ. He highlights that justice has been mainly addressed as distributive justice within the EJ-concept, whereby justice also has a dimension of recognition and procedures. Schlosberg (2004) argues that distributive justice looks at the distribution of burdens and goods between different groups. In contrast, recognition as an element of justice refers to the recognition of "group differences", which are established along identities such as gender, race or socio-economic status. He argues that due to the fact that such differences are attached to privileges and disadvantages, they have to be recognized if one wants to achieve justice (ibid.). "Recognition" and "distribution", as elements of justice, are closely connected since the lack of recognition of group differences is a "foundation for distributional justice" (Schlosberg, 2004, p. 518). Liberal theories on justice such as Rawls influential book *A Theory of Justice* assume and subsume recognition within distributive justice. Schlosberg, however, emphasizes the necessity to acknowledge recognition of group differences as a precise dimension of justice since it is an "inherent precondition[s] for distributive justice" (Schlosberg, 2004, p. 519).

Besides defining "recognition" as a dimension of justice, Schlosberg (2003, 2004, 2007) also argues that procedural justice can be considered a distinct dimension of justice. Justice as procedure focuses on a just participation in (political) decision making. Schlosberg (2003, 2004, 2007) emphasizes that just participation has the potential to safeguard the justice-dimensions "recognition" and "distribution" as well. Lake (1996) acknowledges that some scholars within the field of EJ have already moved beyond distributive justice and consider procedural justice as well, albeit in a narrow sense since they do not address justice in the process of defining environmental problems.

Schlosberg (2007) does not only highlight that without the justice-dimension "recognition" and "procedure" the conceptualization of justice remains incomplete. He also states that distribution, recognition, and procedure are interrelated in the sense that "[…] improved participatory mechanisms can help meliorate both other forms of injustice, but those forms of injustice must be addressed in order to improve participation" (Schlosberg, 2003, p. 86f). Schlosberg (2004) thus calls for a "trivalend" justice approach.

The conceptualization of justice by Schlosberg (2003, 2004, 2007) highlights the different and interrelated dimensions of justice. This more holistic understanding of justice is promising because it can broaden the analysis of environmental justice studies which have often defined justice in a narrow and elusive way. The importance of Schlosberg's conceptualization is shown by recent studies of EJ, which are more nuanced due to a more multifaceted understanding of justice than in early EJ studies. For instance, recently pub-

lished water justice studies base their notion of justice on justice as distribution, as recognition and as procedure (Joy et al., 2014; Mehta et al., 2014; Udas et al., 2014).

Ultimately Schlosberg has enhanced the discussion on the conceptualization of justice within the EJ-concept. However, his three interrelated dimensions of justice do not capture the various normative ideas of justice. In particular, his work does not illuminate the difference between the concepts of (in)equality and (in)justice. Müller (1997) argues that since the term 'inequality' is mainly theorized within Sociology and the term 'justice' mainly in Philosophy, the relationship between these two terms has been neglected. In order to show the difference between the two concepts, I will, in the following, draw on literature of Sociology and Philosophy.

3.2 Inequality in Sociology

Inequality is a classical topic of inquiry within Sociology. In general, inequality refers to the structural phenomena that people belonging to a social category such as class or gender have different access to resources, which positions them in a favorable or disadvantaged position (Solga et al., 2009, p. 15). Even though there are various debates within Sociology with regards to inequality, we base our discussion on the recent work of Diewald and Faist (2011), since it provides a thorough understanding of the concept of inequality. Diewald and Faist's (2011) contribution to the study of inequality is in particular valuable since they stress the genesis of inequalities and thus make a strong call for a distinction between 'heterogeneities/differences' and 'inequalities'. I believe that this distinction is analytically important, also with regard to EJ-studies, since it helps to sharpen the analysis on how environmental inequalities are produced.

The authors argue that the terms 'heterogeneities' or 'differences' refer to the whole diverseness and variety of characteristics of individuals within a society.[6] These characteristics could, for instance, be ascriptive ones such as gender, nationality, and age or others, such as political orientation, lifestyle or qualification. Alongside these heterogeneity-characteristics, society can be categorized into distinct groups. Through social mechanisms, these heterogeneity-characteristics can turn into determinants of inequalities (Diewald & Faist, 2011). One prominent mechanism of inequality production, which was identified within Sociology, is social closure (*soziale Schließung*). This is a process in which social actors aim to monopolize, for instance, resources or power in order to be able to exclude others. The exclusion of others

[6] Diewald and Faist (2011) prefer the term 'heterogeneities' over the term 'difference' since the latter is often only used in the context of cultural differences. However, the terms can be used interchangeably here. I will also use the term 'difference' since it is one of the terms which are applied within EJ. As discussed above, Schlosberg (2003) refers to "difference" and argues that lack of recognition of differences is a cultural and institutional injustice.

thereby unfolds based on heterogeneity-characteristics such as gender or socio-economic status (see Diewald & Faist, 2011also for examples of other social mechanisms). 'Gender' can therefore turn from a 'simple' difference (i.e. heterogeneity-characteristics) into a determinant of inequality if, based on this difference, members of society are excluded or disadvantaged with regard to access to resources, prestige or power etc.. Yet, the relevance of heterogeneities for inequalities is not given; they are socially constructed through negotiation processes that make distinct heterogeneities visible and meaningful as such.[7] Which meaning a certain heterogeneity, such as gender or ethnic class, has within a society is dependent on the social and cultural context of the society and might also shift over time (i.e. a certain migrant group might be perceived over time as belonging to the majority population).

In sum, inequalities are socially produced through both social mechanisms and the valuation and perception of heterogeneities.[8] The term 'environmental inequalities' could refer to the observation that certain mechanisms turn heterogeneities, such as in the socio-economic status, into environmental inequalities since this characteristic influences whether one is exposed to environmental burdens or has access to environmental benefits. This has been done by scholars analyzing inequalities in access to water in Accra. For instance, Amankwaa et al. (2014) have illustrated that the inadequacies of the water supply in Accra are experienced disproportionally in low-income neighborhoods, i.e. by poor urban dwellers. However, they did not study socio-political mechanisms that have turned socio-economic heterogeneities into determinants of water inequalities. This might be overcome by studying the genesis of inequalities as proposed by Diewald and Faist (2011).

3.3 Justice in Philosophy

It would be beyond the scope of this paper to discuss the infinite literature on justice within Philosophy. Yet, with the example of distributive justice this section aims to illustrate that the concept of justice is not as straight forward

[7] This is an important point since, for instance, Stephens (2012) uses the terms 'difference' and 'inequality' as interchangeable and thus argues that inequalities are also, in contrast to inequity and injustice, "neutral descriptions of variation in circumstance" (Stephens (2012, p. 465).

[8] Yet, the genesis of inequalities is complex since the manifestation of social inequalities can reproduce inequalities, but it can also produce new heterogeneity-characteristics (Diewald and Faist (2011). For instance, gender is a heterogeneity which becomes a determinant of social inequalities if social mechanisms take effect that exclude, for instance, women from the university education. This could in turn have the impact that women have a lower qualification than men. Thus, the manifestation of social inequality, i.e. different qualification level, can become a new heterogeneity-characteristic (i.e. qualification level) which, however, can also function as the basis for new inequalities and at the same time can reproduce inequalities that are based on gender.

as it may seem within EJ studies. Within distributive justice one can for instance ask what a just distribution constitutes, or in other words on what basis a just distribution should be made.

Within Philosophy, several definitions of distributive justice can be found (see table 1 below): from an egalitarian point of view, distributive justice would occur if every individual had the same level of goods and services. Thus, an egalitarian understanding of justice equates justice with equality. In contrast, the 'difference-based principle of justice' would allow for inequality of distribution as long as it improves the situation of the weakest in a society. From the perspective of a desert-based principle, justice would be achieved if the distribution is proportional to the effort individuals make, whereby need-based principles focus on the different needs of disadvantaged people. Utilitarians argue that a just distribution should maximize the utility (defined differently, for instance, as economic well-being or also as the lack of suffering) for the majority. In contrast, Libertarians do not advocate for any precise distribution pattern but rather argue whether the distribution process is just the outcome i.e. whether the distribution patterns are also just (Lamont & Favor, 2014). This summarized overview of selected numbers of different understandings of distributive justice gives an impression of how diverse the understanding of distributive justice alone can be, i.e. without considering the other spheres of justice that have been emphasized by Schlosberg (2003, 2004, 2007).

A rare example within the EJ literature that does consider the different meanings of justice is the study of Movik (2014). The author draws attention to the manifestation of different ideas of water justice in the crafting of water policies. She draws on the case of South Africa and the formulation of the Water Allocation Reform policy, which aims to re-distribute the user right to water. She analyzes the shift of the idea of (re)distributive justice within the policy formulation process from a desert-oriented and utilitarian interpretation of justice towards an egalitarian perspective. By unpacking the multiple understandings and interpretations of distributional water justice, she calls for a "pluralistic notion of justice" (Movik, 2014, p. 188).

Table 1: Principles of distributive justice

Theory	Principle
Egalitarianism	Equal shares
Difference-based	permits inequalities that work to the advantage of the most disadvantaged
Desert-based	Rewards proportional to input
Need-based	Rewards according to needs
Utilitarianism	Greatest good for greatest number
Libertarianism	Equal rights

Source: adapted from (McDermott, Mahanty, & Schreckenberg, 2013)

By claiming that it is environmental injustice that environmental burdens or goods are disproportionally distributed among social groups, EJ-scholars employ (implicitly) an egalitarian interpretation of justice. Inequalities in access to water can be valued as injustice since the available piped water cannot be

accessed by the entire population (egalitarianism). At the same time, a valuation of justice does not necessarily follow the boundaries of the different principles of justice. In general, the criteria for a just distribution may also differ depending on the value people attribute to a social good, which is also dynamic in time and place (see Walzer in Schlosberg, 2003). The question of water justice also depends on the idea how water should be delivered. For instance, if one sees the universal access to the piped water as an important feature of water justice, access modalities 'beyond the pipe' are in general dismissed as something to be avoided. Yet, refraining from dismissing private water providers altogether might create more challenges in the valuation of water justice. Overall, more knowledge might be needed to assess the advantages and disadvantages that come with the provision of water by private water providers.

4 Pathways to studying water inequalities and injustices in cities of the Global South

Based on the discussion of the literature on water inequalities in Accra and the discussion of the terms '(in)equality' and '(in)justice', in the following section I attempt to introduce an analytical framework for studying the uneven accesses to waters in cities with a fragmented and co-produced water supply system. This approach includes two analytical steps: first, the genesis of water inequality is taken into the focus of analysis, and in the second step the valuation of these inequalities as water (in)justice is considered as an empirical question.

4.1 Analyzing water inequalities

In the context of a fragmented water supply of the official water utility, a first analysis could be devoted to the question whether the distribution of piped water is dependent on heterogeneity-characteristics. Various scholars have highlighted that piped water is distributed alongside the socio-economic strata of the urban population in Accra. Indeed, poor urban neighborhoods disproportionately lack access to piped water (Ainuso, 2010; Amankwaa et al., 2014; Obeng-Odoom, 2012; Stoler et al., 2012). Amankwaa et al. (2014, p. 84) highlight the "circular and cumulative causation" of poverty. The authors state that poverty determines in which neighborhood poor dwellers can live within a city, while the neighborhood could again contribute to the deprivation of poor dwellers because they lack access to pipe water services. An analysis of the decision making process of the official water utility with regard to water infrastructure projects could be an entry point to studying the root causes of the genesis of socio-spatial (pipe) water inequalities. This analysis would need a historical approach due to the path-dependencies of water infrastructure (Bohman, 2010). Yet, studying inequalities in access to water is more complex in a context where multiple private water providers co-produce the official pipe water supply.

Scholars have (sometimes controversially) discussed the quality and associated health problems of water that is supplied by private providers. This discussion illustrates that water can be turned from an environmental good into a hazard for people. However, it would be too shortsighted to classify water from private water providers as an environmental hazard per se and to thus claim that whoever has to resort to private water providers experiences environmental inequality. As a matter of fact, different social groups might have different needs and values with regard to water provision. For instance, Peloso and Morinville (2014) have shown that the pre-paid system of private water providers is more favorable for poor urban dwellers than the post-paid system of the official water utility. To study different water (service) related needs therefore contributes to a nuanced understanding of water inequalities in a heterogeneous water supply context (Lu, Ocampo-Raeder, & Crow, 2014).

Moreover, different social groups also have different capabilities. With regard to capabilities and inequalities, the capability approach of Sen (1995) is useful since it is equipped to show that urban dwellers have different capabilities and thus are not equally positioned to make use of available opportunities (sf. Udas et al., 2014). Due to the different capabilities, urban dwellers cannot make use of the diverse water access modalities in the same way. For well-resourced urban dwellers, water tankers might be a good alternative to pipe water. Yet, accessing water through water tanker involves higher costs with regard to the water price and the storage facilities that have to be bought, making it difficult for poor urban dwellers to access water directly from tankers

A systematic and in-depth ethnographic study would be needed to understand the advantages and disadvantages for different social groups that arise from resorting to the various types of private water provision (sachet sellers, water tankers, neighborhood sellers or retailers). Such a study would in particular be interesting in spaces – such as the peri-urban areas – which are not covered by piped water infrastructure and where mainly private water providers serve for the water needs of the residents. In peri-urban spaces not only poor urban dwellers move, but new settlements are also established by financially well situated dwellers (Stoler, 2013, p. 188). Focusing on these areas would reduce the bias of current studies that address water inequalities with regard to private water providers only in poor urban neighborhoods in Accra.

The study of everyday water practices and experiences in everyday life is a promising entry point for an in-depth ethnographic study that captures subtle nuances in water inequalities. This was demonstrated by Peloso and Morinville (2014) in the case of a poor neighborhood in GAMA. Studying everyday life with regard to water in Delhi, Truelove (2011) shows an 'embodied' experience of water inequalities. With this expression, she draws attention to the physical work of fetching water, water-related health problems or the physical and psychological experience of criminalization for illegal water access practices, which are mainly suffered by women. The entry point of the everyday thus enables her to go beyond the quantity and quality of water as

inequality indicators. Particularly in the context of a co-produced water supply, it is necessary to study resources expended to fetch water, forgone opportunities due to water collection, reliability of supply, and even income-earning opportunities made possible by the availability of water or denied because of the lack of water (Dill & Crow, 2014; Lu et al., 2014; Obeng-Odoom, 2012).

In a processual approach to (uneven) water access (Ranganathan & Balazs, 2015), the production of inequalities in access to water would be taken into focus. In the terminology of Diewald and Faist (2011), the focus lies on the "genesis of inequalities". Yet, not only the decision making processes of the official water utility shape uneven water access patterns but also micro-politics within the everyday practices between private water providers, the (everyday) state and consumers, including poor households (sf. Ranganathan, 2014). With regards to the latter, Truelove rightly argues that: "If such micro-politics are by-passed by scholars and practitioners, the poor become lumped together as the recipients of uneven urban rights and governance, rather than actors who may experience differing levels of empowerment or disempowerment as they negotiate daily spaces and networks for gaining and controlling their own personal water" (Truelove, 2011, p. 146).

4.2 Analyzing water injustice

Whether inequalities are produced being the subject of discussion or are perceived as such depends on different ideas of justice (Diewald & Faist, 2011). This relation of inequality and justice contributes to the fact that inequalities, for instance in income, might be perceived by some as something that has to be prevented, while others regard it as a reasonable mirror of the heterogeneities within a society (Diewald & Faist, 2011, p. 98). Thus, water justice can be considered an empirical question itself. This is particularly interesting since there is a paucity of scholarly literature in the case of Accra that makes justice in relation to water access a point of analysis.

Based on the analysis of water inequalities, the valuation and perception of the assessed inequalities by those who experience them could be turned into an empirical inquiry. Here, it would be important to study, depending on which idea of water justice is applied, whether the concerned groups perceive their circumstances as a state of water inequality. This understanding could also be contrasted with the definition of water justice adopted by policy makers.

Moreover, the understandings of water justice by policy makers and by those who experience water inequalities could also be contrasted to the legal manifestation of justice ideas in (water) policies. A discourse analysis would be important to understand why certain views on water justice became dominant or contested within a society or between different stakeholders (Zwarteveen & Boelens, 2014). Such an approach to water justice would highlight the contextualized and contested character of justice in terms of place, history, and time, and would consequently stress the plurality of the definition

of justice rather than asking "what justice should be" (Lauderdale, 1998, p. 5). In the following two sections, I will highlight and discuss two debates within the EJ-concept that could be particularly important to foster the analytically separated but entangled studies of water inequalities and injustices. This is the debate on the need for a situated approach to EJ and the question whether there are particularities in EJ in urban areas.

4.3 A situated approach to water inequality and injustice

The call for a situated approach to EJ was raised since the concept of EJ started spreading from the US to various other locations, including the Global South.[9] The geographical expansion of the employment of the concept has been identified as the "most dramatic shift" within the field of EJ (Holifield, Porter, & Walker, 2009, p. 596). The need for a situated approach has also been raised by water justice scholars (Debbané & Keil, 2004; Joy et al., 2014, 2014; Williams & Mawdsley, 2006; Zwarteveen & Boelens, 2014).[10]

By drawing on the substantive differences between the justice concerns in Canada and South Africa in relation to water, Debbané and Keil (2004) emphasize that the concept and the practice of EJ is "locally grounded" and that therefore it is also necessary to embed the term to the specific site under investigation. Debbané and Keil see EJ as a "complex web of multiscalar relationships of contradictions and dependencies that create a unique event of environmental injustice at a given location" (Debbané & Keil, 2004, p. 210). Consequently, they see it as essential to embed global EJ debates in a place

[9] See for instance: for Mexico Carruthers (2008); Moore (2008), for Brazil Wolford (2008), for Latin America in general Sundberg (2008), for Thailand Sneddon and Fox (2008), and for India Williams and Mawdsley (2006), as well as Leichenko and Solecki (2008); Schroeder, St. Martin, Wilson, and Sen (2008). Also, cases within Africa received attention within the field of EJ. Sneddon and Fox (2008), for instance, analyze the EJ mobilization in opposition to the construction of large dams in *Mozambique* (and Thailand). Schroeder (2008) applies the framework of EJ to discuss benefit-sharing in the context of nature conservation in *Tanzania* as distributive (in-) justice. Based on the example of oil- refineries in *Nigeria,* Ikporukpo (2004) discusses compensatory justice that applies for those environmental risk sites where the location is not based on human-made decisions. Within Africa, South Africa has received particular attention with respect to environmental justice, for example in the edited volume by McDonald (2002) that addresses environmental justice as an academic field as well as a movement in South Africa.

[10] Similar debates have evolved within Urban Political Ecology (UPE). By borrowing Chakrabarty`s term 'provincializing', Lawhon, Ernstson, and Silver (2014) argue for a UPE that draws on different places and experiences of the urban, since thoughts and thus theories are linked to places. The outcome of such a provincializing approach would be a more "situated UPE" (Lawhon et al. (2014). They take the first step in this direction by employing the Southern Theory of Urbanism to UPE. One of these insights from the Southern Theory is the entry point of everyday practices which can be studied in order to generate theory.

specific context. By doing so, the structures and processes that shape environmental inequalities at a given location can be analyzed.

Joy et al. (2014) argue that water issues have to be examined in localized studies due to the flowing characteristics of water. Water crosses almost every kind of boundary, be it jurisdictional or administrative. Thus, water "links spatial (and temporal) scales to create 'places' where it is valued, used, and given meaning in specific contextualized ways, and where it relates to specific sources of social power" (ibid. 962).

The need of a situated approach to water justice is also given due to the above discussed different and perhaps contested understandings of justice among places and times, which influence whether water inequalities are perceived as such. Promising work especially regarding the context of the Global South are the case studies of Williams and Mawdsley (2006), Dill and Crow (2014) and Mehta et al. (2014) since they call attention to how the post-colonial history of cities of the Global South shapes contemporary inequalities in access to water.

Mehta et al. (2014), and Williams and Mawdsley (2006) argue that a universalization of environmental/water justices holds the risk that international policies are created which lack sensitivity to the heterogeneous context in which these policies are implemented. For instance, Williams and Mawdsley (2006) stress that the dominant, western environmental justice discourse, without saying what this discourse constitutes, emphasizes deliberative democracy in order to address procedural justice. Williams and Mawdsley (2006), however, argue that deliberative democracy and proclaimed uniformity can be an answer for countries of the west as they possess a relatively homogenous public sphere, but the authors question how far it can be applied in a postcolonial context like that of India, where the society is more fragmented, including a public sphere that is relatively exclusive.

Nonetheless, within a situated approach to water inequalities and injustice, it is still important to study "common core issues [of water inequality and injustices] that are able to transcend such localized understandings" (Joy et al., 2014, p. 967). Only through such an approach it is possible to understand particularities of the (production of) water inequalities and the understanding of water injustices in a certain place but also to identify whether there is a "global shift in the production of environmental 'goods' and 'bads' and the understanding of justice" (McDonald, 2002b, p. 10).

4.4 Is there a particularly urban dimension in water inequalities and injustices in the city?

Another promising aspect for a new pathway towards the study of water inequalities and injustices within the EJ framework would be an engagement with the specifics of urban water inequalities and injustices. Lu et al. (2014) argue that water inequalities are particular to certain "hydrosocial cycles" i.e. cycles of water production and use. They identify four such hydrosocial cy-

cles: (1) irrigation, (2) mining and industry, (3) rural household water, (4) urban water supply (including household uses of water). Even though some of the EJ literature that has been discussed in this working paper focuses explicitly on the urban and also on urban water, specifics of environmental or water inequalities in the urban sphere have not yet been discussed in depth. The study of Debbané and Keil (2004) is promising in this regard since they make 'the urban' of water justice, i.e. inequalities, explicit. They perceive the urban as an important space or scale on which the production of water occurs. However, they do not make apparent why this is the case. Their main argument is that it is necessary to localize the notion of EJ in the context of urban EJ, but they do not clarify the specifics of urban water justice. Schweitzer and Stephenson (2007) also claim that EJ literature has neglected to engage with urban theory and has hence failed to analyze the uniqueness of EJ as an urban phenomenon.

5 Conclusion

This working paper aimed to outline possible analytical pathways that could contribute to deepen the understanding of water inequalities in cities that are characterized by a fragmented and co-produced water supply system. In order to do so, the paper drew on the illustrative case of Accra and the concept of EJ. The paper showed that there already is a body of scholarly literature that points towards water inequalities in Accra (Adank et al., 2011; Ainuso, 2010; Amankwaa et al., 2014; Obeng-Odoom, 2012; Peloso & Morinville, 2014; Stoler et al., 2012; Stoler, 2013; Stoler et al., 2015; van Rooijen et al., 2008). These studies illuminate that mostly poor urban neighborhoods do not receive piped water from the official water utility (Ainuso, 2010; Amankwaa et al., 2014; Obeng-Odoom, 2012; Stoler et al., 2012). Thus, in particular poor urban dwellers have to resort to private water providers to whom they pay higher prices for water while being exposed to associated health-related risks. The available literature is limited to the study of poor urban neighborhoods, whereby mainly disadvantages in resorting to private water providers are highlighted. Moreover, a focus is on proximate dimensions of water access (i.e. water quality, quantity, reliability etc.) and related inequalities. The production of water inequalities is thereby neglected within current water studies in Accra.

In order to address the limits of current studies within the context of Accra, the paper highlighted the concept of EJ. Yet, it is argued that EJ scholars tend to take a certain distribution of environmental burdens and goods as "facts" of injustice (Walker, 2009). However, as a normative concept, very different perceptions and claims of validity are attached to justice, so that claims of justice can be highly contested. If the terms '(in)equality' and '(in)justice' would be analytically distinguished, the EJ approach and water justice scholars would not only gain analytical strength but would also contribute to a new pathway of understanding water inequalities and injustices.

The working paper suggested to first analyze water inequalities in order to then, in a second step, analyze the perceptions of water justices of different stakeholders. In such an approach, not only the researchers' understanding of justice as a benchmark for water inequalities is employed (Lauderdale, 1998, p. 5), but rather the understanding of water justice by different stakeholders in the studied location is used as a question for empirical analysis. The latter would contribute to understanding why (and why not) water inequalities are understood and (not) scandalized as such.

The working paper highlights that studying the water practices and experiences in everyday life would be a suitable entry point for an in-depth ethnographic study on water inequality and injustices. In addition, two discussions that have emerged inter alia within the EJ-concept are regarded as promising to contribute to a new pathway of studying water inequalities and injustice. This is, firstly, the discussion of a situated approach to water inequality and injustice and, secondly, the discussion of the particularly urban within inequalities and injustices in access to water in the cities of the Global South.

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6 References

Adank, M., Darteh, B., Moriarty, P., & Osei, H. (2011). Towards integrated urban water management in the Greater Accra Metropolitan Area: Current status and strategic directions for the future. Retrieved from http://www.switchtraining.eu/fileadmin/template/projects/switch_training/files/Resources/Adank_2011_Integrated_urban_water_management_in_Greater_Accra.pdf

Ahlers, R., Cleaver, F., Rusca, M., & Schwartz, K. (2014). Informal Space in the Urban Waterscape: Disaggregation and Co-Production of Water Services. *Water Alternatives*, *7*(1), 1–14.

Ainuso, K. G. (2010). Urban Water Politics and Water Security in Disadvantaged Urban Communities in Ghana. *African Studies Quarterly*, *11*(4), 59–82.

Amankwaa, E. F., Owusu, A. B., Owusu, G., & Eshun, F. (2014). Accra's Poverty Trap: Analysing Water Provision in Urban Ghana. *Journal of Social Science for Policy Implications*, *2*(2), 69–89.

Bohman, A. (2010). *Framing the Water and Saniation Challenge. A history of Urban Water Supply and Sanitation in Ghana 1909-2005.* (Doctoral Dissertation). Umeå University. Retrieved from https://www.diva-portal.org/smash/get/diva2:306441/FULLTEXT01.pdf

Bullard, R. D. (1994). *Dumping in Dixie. Race, class, and environmental quality*. Boulder, Colo: Westview Press.

Carruthers, D. V. (2008). The Globalization of Environmental Justice: Lessons from the U.S.-Mexico Border. *Society & Natural Resources*, *21*(7), 556–568. https://doi.org/10.1080/08941920701648812

Cheng, D. (2014). The persistence of informality: Small-scale water providers in Manila's post-privatisation era. *Water Alternatives*, *7*(1), 54–71.

Cutter, S. L., & Solecki, W. D. (2013). Setting environmental justice in space and place: Acute and chronic airborne toxic releases in the southeastern United States. *Urban Geography*, *17*(5), 380–399. https://doi.org/10.2747/0272-3638.17.5.380

Debbané, A.-M., & Keil, R. (2004). Multiple disconnections: Environmental justice and Urban water in Canada and South Africa. *Space and Polity*, *8*(2), 209–225. https://doi.org/10.1080/1356257042000273968

Diewald, M., & Faist, T. (2011). Von Heterogenitäten zu Ungleichheiten: Soziale Mechanismen als Erklärungsansatz der Genese sozialer Ungleichheiten. *Berliner Journal für Soziologie*, *21*(1), 91–114. https://doi.org/10.1007/s11609-011-0144-1

Dill, B., & Crow, B. (2014). The colonial roots of inequality: Access to water in urban East Africa. *Water International*, *39*(2), 187–200. https://doi.org/10.1080/02508060.2014.894212

Foster, S. (1993). Race(ial) Matters: The Quest for Environmental Justice Review Essay. *Ecology Law Quarterly*, *20*(721). Retrieved from http://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=1228&context=faculty_scholarship

Ikporukpo, C. O. (2004). Petroleum, Fiscal Federalism and Environmental Justice in Nigeria. *Space and Polity*, *8*(3), 321–354. https://doi.org/10.1080/1356257042000309643

Joy, K. J., Kulkarni, S., Roth, D., & Zwarteveen, M. (2014). Re-politicising water governance: Exploring water re-allocations in terms of justice. *Local Environment*, *19*(9), 954–973. https://doi.org/10.1080/13549839.2013.870542

Kjellen, M. (2000). Complementary Water Systems in Dar es Salaam, Tanzania: The Case of Water Vending. *International Journal of Water Resources Development*, *16*(1), 143–154. https://doi.org/10.1080/07900620048626

Lake, R. W. (1996). Volunteers, NIMBYs, and Environmental Justice: Dilemmas of Democratic Practice. *Antipode*, *28*(2), 160–174. https://doi.org/10.1111/j.1467-8330.1996.tb00520.x

Lamont, J., & Favor, C. (2014). Distributive Justice. In E. Zalta (Ed.), *The Stanford Encyclopedia on Philosophy*. Retrieved from http://plato.stanford.edu/cgi-bin/encyclopedia/archinfo.cgi?entry=justice-distributive

Lauderdale, P. (1998). Justice and equity: A critical perspective. In R. Boelens, G. Dávila, & R. Menchú (Eds.), *Searching for equity: Conceptions of justice and equity in peasant irrigation* (pp. 5–10). Assen, the Netherlands: Van Gorcum.

Lawhon, M., Ernstson, H., & Silver, J. (2014). Provincializing Urban Political Ecology: Towards a Situated UPE Through African Urbanism. *Antipode*, *46*(2), 497–516. https://doi.org/10.1111/anti.12051

Leichenko, R. M., & Solecki, W. D. (2008). Consumption, Inequity, and Environmental Justice: The Making of New Metropolitan Landscapes in Developing Countries. *Society & Natural Resources*, *21*(7), 611–624. https://doi.org/10.1080/08941920701744223

Matsinhe, N. P., Juízo, D., Macheve, B., & Santos, C. d. (2008). Regulation of formal and informal water service providers in peri-urban areas of Maputo, Mozambique. *Physics and Chemistry of the Earth, Parts A/B/C*, *33*(8-13), 841–849. https://doi.org/10.1016/j.pce.2008.06.046

McDermott, M., Mahanty, S., & Schreckenberg, K. (2013). Examining equity: A multidimensional framework for assessing equity in payments for ecosystem services. *Environmental Science & Policy*, *33*, 416–427. https://doi.org/10.1016/j.envsci.2012.10.006

McDonald, D. (Ed.) (2002). *Environmental justice in South Africa*. Columbus: Ohio University Press.

Mehta, L., Allouche, J., Nicol, A., & Walnycki, A. (2014). Global environmental justice and the right to water: The case of peri-urban Cochabamba and Delhi. *Geoforum*, *54*, 158–166. https://doi.org/10.1016/j.geoforum.2013.05.014

Moore, S. A. (2008). The Politics of Garbage in Oaxaca, Mexico. *Society & Natural Resources*, *21*(7), 597–610. https://doi.org/10.1080/08941920701759551

Morello-Frosch, R. A. (2002). Discrimination and the political economy of environmental inequality. *Environment and Planning C: Government and Policy*, *20*(4), 477–496. https://doi.org/10.1068/c03r

Movik, S. (2014). A fair share? Perceptions of justice in South Africa's water allocation reform policy. *Geoforum*, *54*, 187–195. https://doi.org/10.1016/j.geoforum.2013.03.003

Müller, H.-P. (1997). Ungleichheit und Gerechtigkeit: Aktuelle Studien zu Differenz und Gleichheit. In K.-S. Rehberg (Ed.), *Differenz und Integration: die Zukunft moderner Gesellschaften: Verhandlungen des 28. Kongresses der Deutschen Gesellschaft für Soziologie im Oktober 1996 in Dresden* (pp. 23–27). Opladen: Westdeutscher Verlag.

Obeng-Odoom, F. (2012). Beyond access to water. *Development in Practice*, *22*(8), 1135–1146. https://doi.org/10.1080/09614524.2012.714744

Osei, A. S., Newman, M. J., Mingle, J.A.A., Ayeh-Kumi, P. F., & Kwasi, M. O. (2013). Microbiological quality of packaged water sold in Accra, Ghana. *Food Control*, *31*(1), 172–175. https://doi.org/10.1016/j.foodcont.2012.08.025

Pellow, D. N. (2000). Environmental Inequality Formation: Toward a Theory of Environmental Injustice. *American Behavioral Scientist*, *43*(4), 581–601. https://doi.org/10.1177/0002764200043004004

Peloso, M., & Morinville, C. (2014). 'Chasing for Water': Everyday Practices of Water Access in Peri-Urban Ashaiman, Ghana. *Water Alternatives*, *7*(1), 121–139.

Pulido, L. (1996). A Critical Review of the Methodology of Envrionmental Racism Research. *Antipode*, *28*(2), 142–159. https://doi.org/10.1111/j.1467-8330.1996.tb00519.x

Ranganathan, M., & Balazs, C. (2015). Water marginalization at the urban fringe. Environmental justice and urban political ecology across the North-South divide. *Urban Geography*, *36*(3), 403–423. https://doi.org/10.1080/02723638.2015.1005414

Roth, D., Zwarteveen, M., Joy, K. J., & Kulkarni, S. (2014). Water rights, conflicts, and justice in South Asia. *Local Environment*, *19*(9), 947–953. https://doi.org/10.1080/13549839.2012.752232

Schlosberg, D. (2003). The Justice of Environmental Justice: Reconciling Equity, Recognition, and Participation in a Political Movement. In A. Light & A. De-Shalit (Eds.), *Moral and political reasoning in environmental practice* (pp. 77–106). Cambridge, Mass.: MIT Press.

Schlosberg, D. (2004). Reconceiving Environmental Justice: Global Movements and Political Theories. *Environmental Politics*, *13*(3), 517–540. https://doi.org/10.1080/0964401042000229025

Schlosberg, D. (2007). *Defining environmental justice. Theories, movements, and nature*. Oxford, New York: Oxford University Press.

Schroeder, R., St. Martin, K., Wilson, B., & Sen, D. (2008). Third World Environmental Justice. *Society & Natural Resources*, *21*(7), 547–555. https://doi.org/10.1080/08941920802100721

Schroeder, R. A. (2008). Environmental Justice and the Market: The Politics of Sharing Wildlife Revenues in Tanzania. *Society & Natural Resources*, *21*(7), 583–596. https://doi.org/10.1080/08941920701759544

Schweitzer, L., & Stephenson, M. (2007). Right Answers, Wrong Questions: Environmental Justice as Urban Research. *Urban Studies*, *44*(2), 319–337. https://doi.org/10.1080/00420980601074961

Sen, A. K. (1995). *Inequality reexamined*. Oxford: Oxford University Press.

Sneddon, C., & Fox, C. (2008). Struggles Over Dams as Struggles for Justice: The World Commission on Dams (WCD) and Anti-Dam Campaigns in Thailand and Mozambique. *Society & Natural Resources*, *21*(7), 625–640. https://doi.org/10.1080/08941920701744231

Solga, H., Powell, J., & Berger, P. A. (2009). Soziale Ungleichheit –Kein Schnee von gestern! Eine Einführung. In H. Solga, J. Powell, & P. A. Berger (Eds.), *Soziale Ungleichheit. Klassische Texte zur Sozialstrukturanalyse* (pp. 13–20). Frankfurt/New York: Campus Verlag.

Stephens, C. (2012). Urban Inequities; Urban Rights: A Conceptual Analysis and Review of Impacts on Children, and Policies to Address Them. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, *89*(3), 464–485.

Stoler, J. (2013). The Sachet Water Phenomenon in Accra: Socioeconomic, Environmental, and PublicHealth Implications forWater Security. In J. R. Weeks, A. G. Hill, & J. Stoler (Eds.), *Spatial Inequalities. Health, Poverty, and Place in Accra, Ghana* (pp. 181–190). Dordrecht: Springer Netherlands.

Stoler, J. (2014). Sachet water quality in Ghana: The Jury remains out. *Food Control*, *37*, 417–418. https://doi.org/10.1016/j.foodcont.2013.10.004

Stoler, J., Fink, G., Weeks, J. R., Otoo, R. A., Ampofo, J. A., & Hill, A. G. (2012). When urban taps run dry: Sachet water consumption and health effects in low income neighborhoods of Accra, Ghana. *Health & Place*, *18*(2), 250–262. https://doi.org/10.1016/j.healthplace.2011.09.020

Stoler, J., Tutu, R. A., & Winslow, K. (2015). Piped water flows but sachet consumption grows: The paradoxical drinking water landscape of an urban slum in Ashaiman, Ghana. *Habitat International*, *47*, 52–60. https://doi.org/10.1016/j.habitatint.2015.01.009

Sundberg, J. (2008). Placing Race in Environmental Justice Research in Latin America. *Society & Natural Resources*, *21*(7), 569–582. https://doi.org/10.1080/08941920802111538

Swyngedouw, E., & Cook, I. R. (2009). Cities, social cohesion and the environment. Retrieved from http://www.sed.man.ac.uk/geography/staff/documents/Cities_social_cohesion_and_environment.pdf

Swyngedouw, E., & Heynen, N. (2003). Urban Political Ecology, Justice and the Politics of Scale. *Antipode*, *35*(5), 898–918. https://doi.org/10.1111/j.1467-8330.2003.00364.x

Truelove, Y. (2011). (Re-)Conceptualizing water inequality in Delhi, India through a feminist political ecology framework. *Geoforum*, *42*(2), 143–152. https://doi.org/10.1016/j.geoforum.2011.01.004

Udas, P. B., Roth, D., & Zwarteveen, M. (2014). Informal privatisation of community taps: Issues of access and equity. *Local Environment*, *19*(9), 1024–1041. https://doi.org/10.1080/13549839.2014.885936

United Church of Christ, Commission for Racial Justice (1987). A National Report on the Racial and Socio-Economic Characteristics of Communities with Hazardous Waste Sites. Retrieved from http://www.ucc.org/about-us/archives/pdfs/toxwrace87.pdf

Van Rooijen, D. J., Spalthoff, D., & Raschid-Sally, L. (2008). Domestic water supply in Accra: how physical and social constraints to planning have greater consequences for the poor. Retrieved from http://wedc.lboro.ac.uk/resources/conference/33/Van_Rooijen_D_GHA.pdf

Walker, G. (2009). Environmental Justice and Normative Thinking. *Antipode*, *41*(1), 203–205. https://doi.org/10.1111/j.1467-8330.2008.00663.x

WHO/ UNICEF (2014). Progress on Drinking Water and Sanitation, 2014 update. Retrieved from http://gbv.eblib.com/patron/FullRecord.aspx?p=1769047

Williams, G., & Mawdsley, E. (2006). Postcolonial environmental justice: Government and governance in India. *Geoforum*, *37*(5), 660–670. https://doi.org/10.1016/j.geoforum.2005.08.003

Wolford, W. (2008). Environmental Justice and the Construction of Scale in Brazilian Agriculture. *Society & Natural Resources*, *21*(7), 641–655. https://doi.org/10.1080/08941920802096432

Zwarteveen, M. Z., & Boelens, R. (2014). Defining, researching and struggling for water justice: Some conceptual building blocks for research and action. *Water International*, *39*(2), 143–158. https://doi.org/10.1080/02508060.2014.891168

7 Appendix

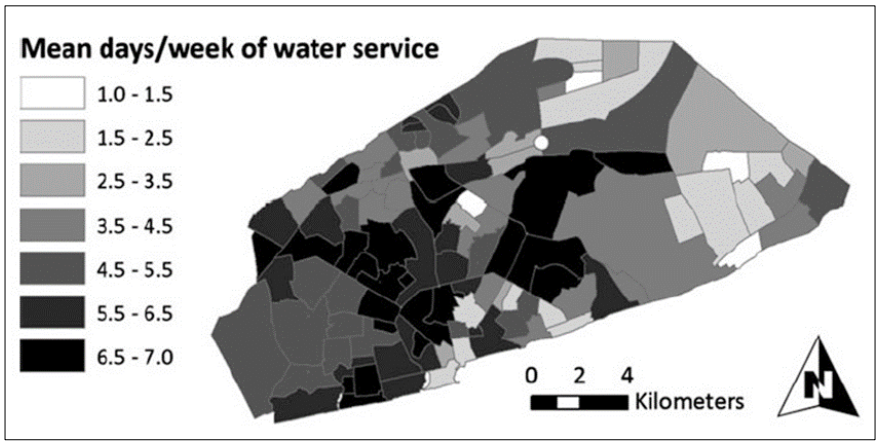

Figure 1: Mean days per week of water service in the Accra Metropolitan Area (AMA) estimated by neighborhood from the GWCL 2009 rationing schedule

Source: Stoler 2013:183

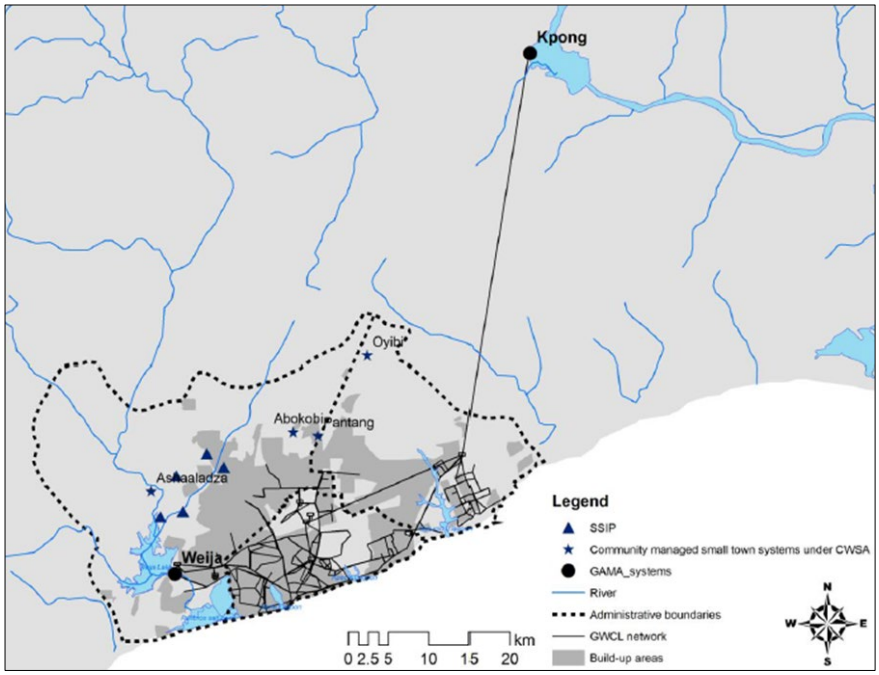

Figure 2: Water supply systems in the Greater Accra Metropolitan Area (GAMA)

Source: Adank et al 2011: 24

WaterPower is a laboratory for experimenting with novel ways of doing research based on the integration of multiple disciplines, approaches, methods and non-academic knowledge through dialogue and collaboration.

We contribute to current debates on society-nature relations by mapping, analyzing and understanding processes that unfold in the urban water sphere.

Our analyses critically study the interplay of socio-political and ecological processes and how they configure place and scale.

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