

Water Affordability in the United States: An Initial Exploration and an Agenda for Research

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ABSTRACT

This paper explores water affordability issues in the United States. It begins with a review of the implications that the adoption of the approach to water management based on seeing water as an economic good has had for water affordability in the developing world. It then moves on to consider the issue of water affordability in wealthy countries by looking at the case of the United States since the 1990s. After an exploration of water affordability problems for the country as a whole and of the approaches that the water provision industry has taken to meet them, the paper centers on the case of Detroit, which has become very prominent recently because of the massive disconnections for nonpayment adopted by the city's water utility. The article concludes that water affordability problems in the United States are significant and likely to grow in the near future, and it presents an agenda for research.

The last few decades have seen an explosion of concern over water issues around the world. The increasing recognition of the scarcity of water, as well as the heightened visibility of water availability and access problems around the world, have brought the attention of the media, policymakers, academics, and the general public to water issues. Among the many water challenges that modern societies face, water affordability, or the conditions that make it possible for groups of limited economic means to access a minimum amount of water to cover their most basic

human needs, is a central one. The focus of those concerned about water affordability, however, has mostly been put on countries in the Global South, where the problem is most severe and widespread. Although completely reasonable, this emphasis on poor countries has contributed to obscure water access issues in wealthy nations. Most people in the developed world take access to clean water through taps in their homes for granted, and the relatively low cost of the service compared to other utilities or expense categories means that the affordability of water is often not even considered as a potential problem. However, increasing scarcity, mounting costs of provision due to higher quality standards and infrastructure needs, and growing poverty and inequality have led to a recent surge of concern about the affordability of water in wealthy countries. Yet the incipient and fragmentary character of this growing attention means that we still do not have a well-developed framework of analysis for this phenomenon. How is water poverty in wealthy countries different from that in the Global South? How serious a problem is it? What kind of research has been done on the subject? And what general approaches and specific measures have been adopted to try to address the problem? This paper attempts to answer these questions by presenting an initial but comprehensive exploration of water affordability in the United States.

In order to do so, the paper advances in four stages. First, I explore how recent changes in how we approach water provision in the world have brought water affordability issues to the fore, particularly in developing countries. I also review some of the ways in which policymakers and activists have reacted to this problem, paying special attention to the emergence of the human right to water. Then I move on to analyze water affordability concerns in economically wealthy countries with an exploration of the case of the United States. In the second section, I review the scant research available on the topic, as well as how the water delivery industry began to identify and address the problem in the 1990s. Third, I study the developments in water affordability in the United States in the last decade and a half. Fourth, I present evidence on how water affordability problems have developed and been handled in Detroit, where

this has become a serious issue that has drawn international attention. Finally, I conclude by proposing a research agenda for water affordability.

Approaches to Water Provision and the Affordability of Water

Water is an indispensable resource for human life, and it is central to the survival and proper functioning of societies and ecosystems. Access to water has been determining the location of human settlements for millennia (Mithen 2012), and guaranteeing its availability and access has been a central concern of modern urban life.

The modern history of water provision can be traced back to the 19th century, when in rapidly growing cities, the private sector started providing water to wealthy areas whose inhabitants were able to afford the cost of the service. Around the turn of the 20th century, however, public authorities began taking over water provision in order to ensure that everyone would have access to the resource and diseases and fires could be prevented and fought (Masten 2010; Hassan 1985). Throughout most of the 20th century, governments remained in charge of water delivery, and they went to great lengths to build the infrastructure necessary to bring water wherever it was needed (Allan 2003). However, the costs of these massive investments were not passed on to consumers. Water had become a citizenship right (Marshall [1949] 1964), and governments took demand as given and focused on making sure that they were able to provide the necessary amount to meet it (engaging in what economists call ‘supply management’). The outcome was that water was heavily subsidized and customers – not only domestic users but also farmers and industry – received very cheap water without having to worry about limiting their demand.

In the 1980s and 1990s, however, the world became acutely aware of the scarce nature of water. Growing environmental concerns and the realization that, in many parts of the globe, there was not enough water to meet demand, led to the adoption of a new approach to water management. Known as the view of ‘water as an economic good,’ this approach posits that, in order to be used judiciously, water needs to be properly valued (Briscoe 2005; Perry, Rock, and Seckler 1997). A

corollary of this view is that consumers should pay the full cost of the delivery of the water they receive. In a world in which water was heavily subsidized, this generally implied an increase in the cost of water for final users, which would bring the sought-after reduction in demand. However, in the 1990s and early 2000s, raises in water tariffs (often accompanied by privatization of water provision), led to protests in many parts of the developing world where water became prohibitively expensive, and the issue of water affordability came to the fore (Mehta and Mirosa 2004).

A number of policy reactions followed, such as South Africa's adoption of a nation-wide free basic water allocation for poor people (Muller 2008; Smith 2012). However, the most significant response to the problem was the emergence of the 'human right to water,' promoted by activists and policymakers as an alternative generic approach to that of 'water as an economic good' (Mirosa and Harris 2011). Although a number of actors see these as compatible (and, even more, complementary) approaches to water management, the rise of the human right to water can be understood as reflecting the view that, no matter what the requirements of economics, making sure that people have access to water and can afford it should be the absolute priority.

This discussion has been playing out in global fora and in developing countries for the last decade and a half. However, the issue of water affordability (and the human right to water) has seldom been brought up in developed nations. Does this mean that wealthy countries such as the United States do not have problems of water affordability? Is the human right to water irrelevant to countries in the Global North? In order to answer these questions, the rest of the paper analyzes water affordability in the United States.

Identifying Water Affordability Problems in the United States

Water affordability has not traditionally been a major concern in economically developed countries. As Rogers argues: "The level of affluence seems to determine the types of water problems a country can expect" (Rogers 1986:36). Thus in wealthy countries, concerns over water quality and availability are the major focus of attention. Water quality

problems affect everybody in a given community, including affluent households, and hence are likely to be highly visible in media accounts and occupy a prominent place in the priorities of politicians. Recent examples include the tap water ban that authorities imposed on Toledo, Ohio residents in August of 2014 because of algae contamination of the municipal water supply, or the chemical spill that left 300,000 residents of West Virginia without clean water for several days in January of 2014, both of which made national news (Fitzsimmons 2014; Gabriel 2014). Even more conspicuous in national conversations are water availability issues, particularly now that California is experiencing a severe multi-year drought and that population and economic growth are stressing water supplies in the West and Southwest of the United States (Nagourney and Lovett 2014).

The strong reaction to the problems described above is itself a reflection of how access to water is taken for granted in wealthy countries such as the United States. An average of 99.2% of the population of high-income countries has access to improved water sources,⁴ and in the United States the average household spends only 0.5% of its income on water and sewerage bills (Environmental Protection Agency 2009:9).

It is hardly surprising, then, that water institutions in developed countries tend to focus on issues of quality and availability rather than access and affordability. In the United States, there is federal legislation regarding water quality, which started in the 1970s with the passing of the Clean Water Act and the Safe Drinking Water Act, but there is a dearth of programs addressing issues of affordability. As Wescoat et al. (2007) show, most of the national programs that deal with affordability aim to support the water delivery systems of small and low-income communities so that they can meet quality standards, but they do not offer help to individual households struggling to pay their water bills. How much attention has there historically been on water affordability in the United States?

⁴ Data from the World Bank's World Development Indicators retrieved on October 29th, 2014 from:

<http://databank.worldbank.org/data/views/variableSelection/selectvariables.aspx?source=world-development-indicators>

There is very little research on issues of poverty and the affordability of water in the United States (Wescoat Jr. et al. 2002). The classic study in this field is Brown and Ingram's (1987) *Water and Poverty in the Southwest*. Besides its limited geographical reach, this study focuses on access to water by poor Hispanic and Native American communities in rural areas. The context of the study is the increasing scarcity of water, which leads to more competition and higher cost of the resource and makes it harder for poor communities to obtain it. The push to use markets for water allocation, consistent with the move to view 'water as an economic good' described above, steers water away from vulnerable groups, who have less capacity to act effectively in modern water markets than other more aggressive and secure groups (Brown and Ingram 1987:5-6).

A project following up on Brown and Ingram's work was undertaken a decade and a half later by Wescoat and his colleagues with a focus on Colorado (Wescoat Jr. et al. 2002; Wescoat, Headington, and Theobald 2007). The project expands the object of analysis to include other low-income groups such as the urban poor, although the emphasis continues to be on infrastructural issues such as plumbing, and affordability in itself is not a main focus of the study. However, the authors argue that existing research, by ignoring the situation of the most vulnerable groups and underreporting (because reporting lack of access to water can be grounds for losing the custody of children, for instance), "give the impression that low-income water problems involve very small groups of unserved and underserved populations. As low-income water problems become less frequent at the national level they become more localized politically, i.e., they become problems for local jurisdictions and organizations" (Wescoat et al. 2007:807).

It is not surprising, then, that more attention to affordability issues is found within the water provision industry, which has to deal with those local problems, than in academic research. Writing for the journal of the American Water Works Association (AWWA) in the mid-1990s, Beecher (1994:61) argued that "[e]scalating water and wastewater rates are bringing affordability issues to the forefront for water utilities." Beecher explicitly referred to affordability as a new problem, a point that was

mirrored in the accounts of other observers also writing for publications of the professional association of water utilities in the United States (AWWA). Rubin (1994), for example, asked “Are Water Rates Becoming Unaffordable?”, and answered in the affirmative, and both Saunders et al. (1998:1) and Hasson (2002) emphasized the growth in significance of affordability problems. In part, the increase in perceived importance of the problem is related to the fact that, in contrast to what the work of Brown and Ingram reviewed above seemed to imply, “[t]he problem of affordability of drinking water is not limited to customers of small or rural water systems” (Rubin 1994:79).

Beecher (1994) claimed that rising water rates would have negative consequences for low-income households, and new measures would have to be adopted in order to help these customers pay their bills. Similarly, Saunders (1998:xxii) argued that “[p]oor households are typically not refusing to pay for water service; they are becoming more unable to pay for water service,” and that there was a need “to address the gap between water prices and low-income households’ ability to pay”.

According to Beecher (1994:61), the generalized increase in water rates in the 1990s was the product of “the need to comply with the requirements of federal drinking water standards under the Safe Drinking Water Act, the need to replace an aging water supply infrastructure, and the need to meet growing demand for water.” These are essentially the same factors highlighted in much more recent accounts of growing water rates in the United States (Maxwell 2010; Amirkadji et al. 2013), although some authors also make the case that water has traditionally been underpriced (Hoffbuhr 2004). Let us explore the first two of these factors in some more detail.

Water sector professionals and institutions have paid considerable attention to the need to replace aging infrastructure. As a report from the American Water Works Association spells out, the piped infrastructure for water provision in the United States was laid out in three waves: in the late 19th century, in the 1920s, and after World War II. The materials used for the pipes in each successive wave had shorter lifespans, with the result that all of them are due to be replaced in the first three decades of the current century (AWWA 2001). This radically increases the need for

infrastructure investment in the present and near future which, in order to be financed by water utilities, requires higher water tariffs.

The higher operational costs, and therefore higher water rates, necessary to comply with federal water quality standards have also been well established. The key point in this process was the enactment of the 1996 amendments to the Safe Drinking Water Act. The United States Environmental Protection Agency (EPA) had considered the affordability implications of its regulations since its creation in the 1970s, yet it was in 1996 that it “refocused attention on affordability issues” (Environmental Protection Agency 1998:11). Affordability for the EPA, however, refers to the capacity of water provision systems to absorb the increased costs of water quality regulations. Since these costs are ultimately born by customers, there is a direct relationship between the costs of the utility and the water tariffs paid by users. Yet the latter are not the primary concern of the EPA (Stratus Consulting 2013:3). In 1996, the EPA established a Drinking Water State Revolving Fund to aid utilities to meet the new regulations,⁵ and released affordability guidelines. These, however, are only recommendations for states, who are the final deciders in this matter and who do not even need to get the EPA to approve or comment on the criteria they adopt.

How does the EPA conceptualize affordability? For the EPA, a maximum affordable water bill (including water and wastewater) is one that does not exceed 2.5 percent of median household income.⁶ This approach, although with different percentages, has been adopted by a number of actors (see Environmental Protection Agency 1998:Appendix E). However, this type of criteria has often been applied to communities and groups of population as a whole by looking at average or median water rates. Although helpful and simple for utilities, several observers have criticized the practice because, while it allows actors to see the

⁵ However, Amirhadji et al. (2013:17) argue that “funding needs still far outweigh availability.”

⁶ The EPA has continued to promote ‘affordability’ as a criterion for setting up water tariffs (see, for example, Environmental Protection Agency 2006), even establishing an 18-member Small Systems Affordability Work Group that met 5 times between 2002 and 2003 and released a final report in 2003 (Resolve, Inc. 2002; EPA Science Advisory Board 2002; Affordability Work Group 2003). In this report, the Work Group recommended more flexibility in affordability criteria in order to account for the circumstances of different types of utilities and customers.

general affordability of water rates, it does not take into account the situation of those worse off (Rubin 1994; 2001; Amirhadji et al. 2013). The average water bill in a city might be under 2.5 percent of the median household income, but the poorest households might have a much lower income, which would raise their percentage of water tariffs to income above the threshold.

This brings up the issue of the degree to which affordability is considered when setting up water tariffs in the United States. Beecher makes the case that water utilities “prefer not to take on too much social responsibility” and want social agencies to provide support for affordability issues (Beecher 1994:63). This is confirmed by a fascinating dialogue among several water utility managers that the journal of the American Water Works Association published in the 1980s (Wubbena et al. 1983). The roundtable conversation deals with ‘equitable water rates,’ but the participants refer to equity and fairness in terms of the relationship between the rates and the cost of the service received by users, that is, as meaning that people should pay for the cost of provision of the water services that they enjoy, and not more or less. In this discussion, affordability is not considered an equity issue. When affordability comes up, with reference to the adoption of a low lifeline rate that ensures affordability even for the poorest households, one of the managers states: “When people in a public forum bring up the idea of a lifeline rate, we tell them we are good engineers and business people but poor social workers” (Wubbena et al. 1983:27).

This attitude should not be unexpected. The American Water Works Association has been producing since 1954 a manual on water rates that provides the standard for the sector as a whole on how to set them.⁷ The manual states: “Water rates are considered fair and equitable when each customer class pays the costs allocated to the class and thus cross-class subsidies are avoided” (Zieburz and Giardina 2012:3). This is what is usually known as the ‘cost of service’ approach, and it is precisely the

⁷ In the six editions of the manual published since 1954, there have been many changes in the finer points, but the basic approach to setting water rates has remained consistent (Mumm and Matthews 2004:67).

one invoked in the discussion among water managers reviewed above. For the AWWA, then, equity and fairness are not defined in terms of affordability. They are reached when each customer pays the full cost of the services she receives.

In his exploration of an objective way of measuring equity in water charges, Teodoro (2005) reviews five different understandings of equity in the determination of water tariffs. These are: basic human right, social justice, affordability, efficient resource use, and cost of service. The ‘basic human right’ approach, for instance, would involve the provision of a basic amount of water free of charge, whereas the ‘affordability’ approach suggests that water rates should be put in the context of the income or economic capacity of users (who do not necessarily need to be only residential customers). This scheme suggests that adopting a ‘cost of service’ approach is at odds with pursuing ‘affordability’ (or social justice, or the provision of water as a human right), which reminds us of the discussion that took place in developing countries between the views of ‘water as an economic good’ and the ‘human right to water’ explored above. However, even if water utilities in the United States, following AWWA’s recommendations, follow the ‘cost of service’ approach when establishing water tariffs, we will see below that they have not ignored affordability concerns altogether.

Yet the forgoing discussion suggests the existence of an institutional feature that makes consideration of affordability issues in the United States difficult. Affordability concerns are left to local water providers to manage, but they tend to be technical people (engineers and managers) who do not have a particular interest or expertise in affordability problems. Paired with the fact that those affected tend to be relatively powerless, this creates a situation in which it is easy to disregard the problem or, at least, give it a low level of priority. I mentioned above, however, that the dynamics of the water sector in the 1980s and 1990s led some observers to raise concerns about the affordability of water services in the United States. What effect did these reflections have?

In her call for attention to affordability issues, Beecher (1994:63-64) suggested the adoption of measures already in place for the energy sector such as “counseling and referral, community assistance, monthly

billing, arrearage forgiveness, payment discounts, income-based payments, lifeline rates, targeted conservation, disconnection moratoria, and flow restriction.” The rationale was that, despite their costs, all these policies are preferable to the disconnection of the service for non-payment, which is onerous not only for the customer but also for the utility. In 1998, the American Water Works Association Research Foundation contributed to the debate by producing a comprehensive report on *Water Affordability Programs* (Saunders et al. 1998), which also lays out the different ways in which water providers can ensure affordability for their customers. Similar guides were produced by Saunders (1992), Hasson (2002), Beecher and Shanaghan (1998; 1999), and Cromwell et al. (2010). To what extent have these initiatives been adopted in practice?

Since there is no federal affordability mandate, the development of affordability programs in the United States depends on the initiative of particular water utilities. Portland’s water provider, for instance, was a pioneer in developing affordability programs in the 1990s, while others do not have any program at all (Hasson 2002). There is no government agency or research group that systematically tracks and reviews affordability programs in the United States. However, a survey undertaken by the American Water Works Association in 2004 among its members provides a snapshot of the situation in the country. The survey found that, of the 338 responding utilities, 64% did not consider nonpayment of water bills a big problem, whereas 22% rated it a big problem and 29% considered it a growing problem. Only 5.30% of utilities reported having more than 3% of their residential water bills unpaid, and the largest category for this question was for utilities that had between 0.1% and 1% of their bills unpaid, which was chosen by 58.28% of providers. 92% of survey respondents declared they occasionally disconnected the water service for nonpayment, and 10.35% affirmed not having any affordability programs in place. Interestingly, the main reason provided for the absence of such initiatives was that “all customers should pay their own way” (60% of this group of utilities), followed by “utility does not have a problem with late payments” (56%). The option “utility cannot afford to pay for an assistance program” was chosen by 40% of utilities (respondents were able to choose more than one reason for not having an

affordability program). For those that did have affordability programs, the variety of measures that they used fell predominantly into those whose goal was to “shrink the overdue caseload and arrearages,” rather than those focused on “shrinking the bills.” Finally, it is worth mentioning that 40% of respondents thought that their assistance programs addressed current needs, while 31% thought that they fell short (Cromwell, III et al. 2010:13-19). This quick review shows that, despite the existence of a large number of affordability programs, many water utilities perceive affordability to be a problem that requires more resources and initiatives.

In the 1990s and early 2000s, the water delivery industry predicted an increase in water tariffs and identified an incipient affordability problem. It offered policy options to water utilities about how to deal with the problem, and many providers adopted affordability measures. What has happened since then? Has the problem been resolved, or has it become more severe? The next section reviews the recent evolution of affordability problems in the United States through an exploration of national-level data.

Recent Developments in Water Affordability in the United States

In the last few years, concern about water affordability problems in the United States has increased. Maxwell’s (2010) exploration of trends in water rates shows how the rise that started in the 1990s has continued and intensified. Maxwell cites the work of a number of consultancy firms that track the evolution of water rates. For instance, NUS Consulting has been conducting a study of commercial water rates for over a decade and recently reported an average annual US rate increase of 7.6%. The Raftelis Consulting Group has found average growth rates of 12% per year (Maxwell 2010:28). Similar ongoing studies, with comparable findings, are produced by Global Water Intelligence (2012), Black & Veatch (2013), the American Water Works Association (Rahill-Marier and Lall 2013) and, since 2010, Circle of Blue (Walton 2014). The growth in water tariffs has been reported in national media (McCoy 2012), and a wider range of actors than in the past have started to pay attention to water affordability issues, from consumer groups (Wong et al. 2014) to water

research institutions (Pacific Institute 2013; Weston 2014), civic organizations (Moss 2014), and political groups such as the U.S. Conference of Mayors (Stratus Consulting 2013).

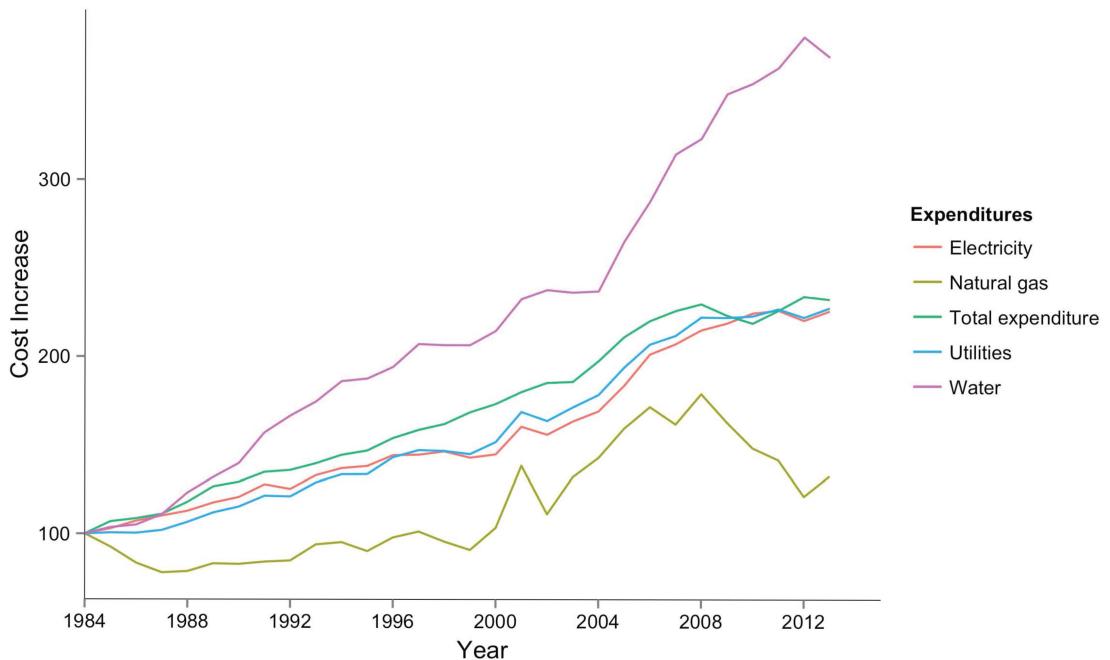
Much attention has been devoted to water affordability in the last few years because of the high profile case of Detroit, which I explore in more detail below. However, this is not the only instance in the country in which water access has been compromised because of high water rates. Amirhadi et al. (2013), who offer the most thorough study of the case of Detroit to date, also explore the situation in Massachusetts, where despite friendly affordability regulation “the number of shutoffs in Boston nearly tripled between 2003 and 2006” (Amirhadji et al. 2013:27).⁸ Moreover, attention to water affordability issues is not limited to the United States among economically wealthy countries. We have recent examples in Portugal (Martins et al. 2013), Ireland (Weston 2014), France (Soullier 2014), Australia (Green 2014), and Spain (Gil Lara 2013).

Is this attention justified? Leaving aside specific highly visible examples, what do the data on water affordability in the United States say? Figure 1 shows the evolution of water charges in relation to all expenditures for the average American household from 1984 to 2013, as collected in the Consumer Expenditure Survey. As the graph clearly shows, water expenses have increased much faster than overall expenditures and all other utility charges, thus increasing the percentage of a household’s budget devoted to paying for water.

In order to gauge affordability, however, we need to move beyond water rates and look at the percentage of household incomes that water expenses represent, and specifically for the poorest segment of the population. Given the nature of income data, we need to be cautious when analyzing this information. The lowest category of income, for instance, includes self-employed people whose businesses have losses. For some years (as it has been the case since the economic crisis in 2009), the presence of this population means that the average income of those who make less than \$5,000 a year is actually negative, which makes the ratio of water costs to

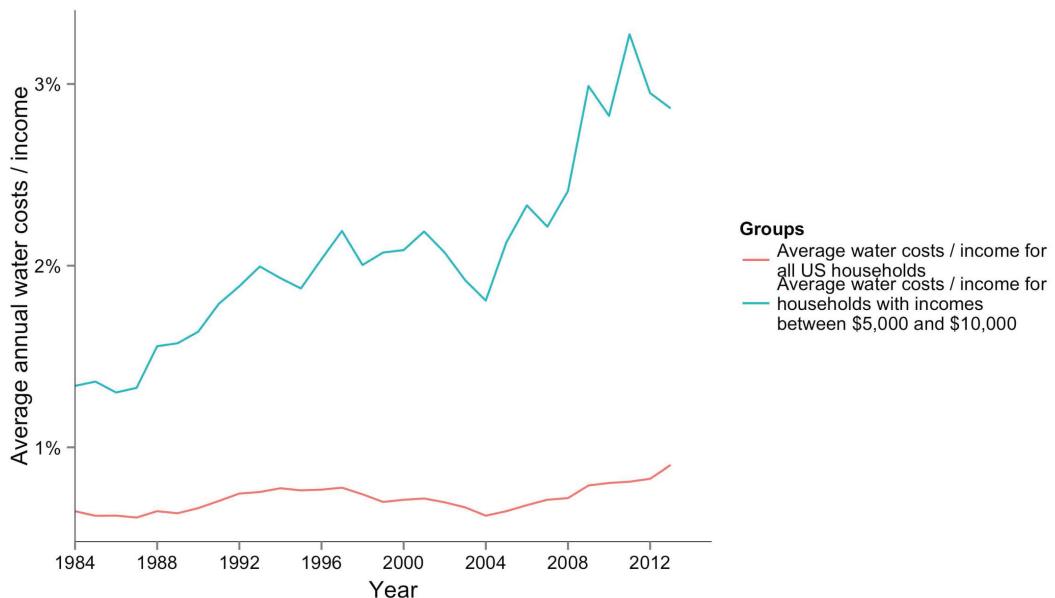
⁸ The case of Massachusetts had already been explored in the 1990s by the National Consumer Law Center (Brockway 1991; cited in Saunders 1992:21).

Figure 1: Cost Increase of Annual Average Household Expenditures



income meaningless. This category also includes retired people who do not have an income and live off savings, many of whom should not be considered at risk in terms of water affordability. In order to avoid the complications of this group, Figure 2 shows the evolution of the average percentage of water tariffs on income for both U.S. households as a whole and for those who report income from \$5,000 to \$10,000 a year (the second lowest group in the Consumer Expenditure Survey), for the period from 1984 to 2013. Figure 2 shows that, although for the average American household water tariffs have remained a small, although slightly increasing, percentage of its income (below 1%), low-income households have seen their water rates as a proportion of income increase markedly to about 3%. Even averaging all the households in this category, the percentage is larger than the 2.5% of median income that the EPA uses as a threshold of affordability, and therefore it is a clear indicator of possible water affordability problems for many American households.

Figure 2: Average Annual Water Costs / Income for Different US Household Groups, 1984-2013



A more direct and actual measure of affordability issues is provided by disconnections of water services for nonpayment. Unfortunately, there is no comprehensive data on this topic for the United States as a whole. However, the latest wave of the American Housing Survey (2013), includes a new variable with information on households that received shut-off notices for utilities in the previous 3 months, as well as whether the service was in fact disconnected. The variable gathers this information for all utilities, and therefore there is no way to figure out if the service that was disconnected was water. However, knowing that a household had one of its utilities disconnected is a sign that it may be struggling to pay its utilities in general. Whether the household decides to stop paying one or another is not as significant as knowing that it has problems paying for them as a whole.⁹ Analyzing this data, therefore, can be helpful in assessing the degree to which utilities, water among them, are unaffordable for American households.

⁹ Moreover, the decision of what utility to stop paying first probably obeys to pragmatic reasons, such as when the bill was received, which one is perceived as more necessary at the time, or the perception of what the consequences of not paying a given bill will be, rather than a sign of their individual affordability.

Table 1: Utility Shut-Offs for U.S. Housing Units, 2013

% of occupied units that received a utility shut-off notice in the previous 3 months	7.83%
% of occupied units that had a utility shut-off in the previous 3 months	0.95%
% of occupied units whose annual water tariffs are higher than 3% of the unit's income	7.47%
% of occupied units whose annual water tariffs are higher than 5% of the unit's income	3.70%
% of occupied units that received a utility shut-off notice whose annual water tariffs are higher than 3% of the unit's income	11.77%
% of occupied units that received a utility shut-off notice whose annual water tariffs are higher than 5% of the unit's income	6.67%
% of occupied units that had a utility shut-off whose annual water tariffs are higher than 3% of the unit's income	17.01%
% of occupied units that had a utility shut-off whose annual water tariffs are higher than 5% of the unit's income	9.69%

Table 1 shows that utility shut-off notices and actions are relatively frequent. 7.83% of all occupied housing units in the United States reported receiving a utility shut-off notice in the three months previous to the interview, and 0.95% had a utility disconnected. Interestingly, when we look at the percentage of income spent on water services for the units that received notices of shut-off or that experienced actual shut-off, we see that these are not particularly large. Only 11.77% of the occupied housing units that received a shut-off notice spent more than 3% of their income on water tariffs, and only 17.01% of the households that had a utility shut off devoted more than 3% of their income to water. Although, as mentioned above, the data on disconnections are for all utilities, and we know that all

other utilities are more expensive than water, this suggests that many households for which water charges are not a high percentage of their income struggle to pay their utility bills. This suggests that we should not look only at the level of water tariffs when assessing affordability problems. Notices of service disconnections, and disconnections themselves, seem to happen quite often even when the proportion of water to income is not particularly high.

Table 2 provides data on how much American households pay for water. These are average measures, which have the danger of obscuring the situation of those in most hardship, but they are indicative nonetheless.

Table 2: Annual Income and Annual Water Tariffs for U.S. Housing Units (in US\$), 2013

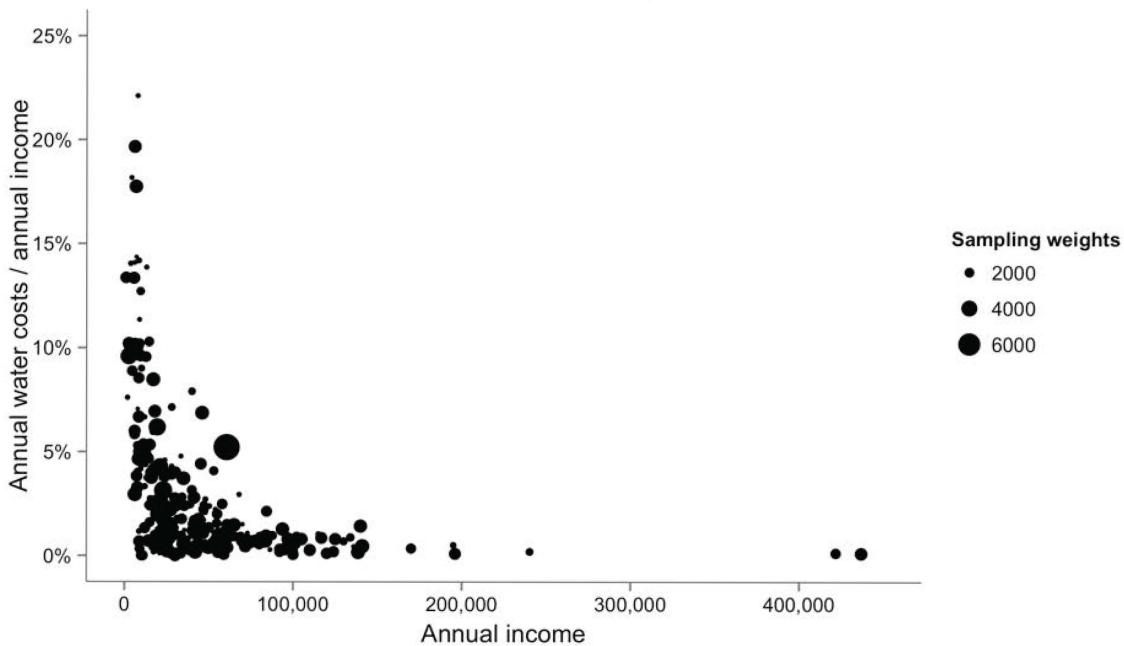
	Mean	se	Median
Annual income for units with notice of shut-off	43,761	922.08	29,948
Annual income for units with utility shut-off	36,667	2,083.30	25,420
Annual income for units without shut-off	67,966	383.43	44,974
Annual water tariffs for units with notice of shut-off	609	14.06	500
Annual water tariffs for units with utility shut-off	660	45.73	560
Annual water tariffs for units without shut-off	608	3.45	500

Median and mean household income are considerably lower for those households that received notice of utility shut-offs (and actual disconnections) than for households without problems paying for utilities. The median income of American households was \$44,974 in 2013, whereas households that had a utility disconnected had a median income of just \$29,948. Table 2 also shows that the average and median annual expenses in water services do not differ much among these groups. Both households with a utility disconnection and those without it (and without notice) had average annual water tariffs around \$609. The most relevant piece of information that can be extracted from this table is that, if we divide the median water charges by the median income of those households that had a utility shut off, the resulting percentage is only

1.67% ($\$500/\$29,948$). This is considerably lower than the EPA threshold of 2.5%, and suggests that households are having a hard time paying their utility bills even if their water charges represent a lower percentage of their income than what experts consider a danger for the affordability of the service. I come back to this point and its possible implications when I formulate my agenda for research below.

In order to provide some sense of the burden of water charges for specific housing units, Figure 3 plots, for those households that have experienced utility shutoffs, the percentage of annual income that water tariffs represent by household annual income. The size of the dots corresponds to the sampling weights (i.e., the larger the dot, the more actual units in the total population that sampling unit represents). The graph shows that utility shutoffs occur more frequently at low income levels, but not exclusively. It also shows the regressive character of water tariffs, since at lower levels of income we find much higher percentages of water costs over income.

Figure 3: Annual Water Costs / Income by Annual Income for Housing Units that Experienced a Utility Shut-off in 2013



National survey data provide a good indication of the extent and degree of water affordability problems in the United States. However, since water provision takes place at the municipal level and responds to local circumstances, I now devote a few paragraphs to a brief overview of water affordability problems in Detroit, which have been making headlines in the last couple of years.

Water affordability in Detroit

Detroit has been going through hard times. It is estimated that the city lost 25% of its population in the first decade of the 21st century (Seelye 2011), and it is in the middle of a fiscal crisis that left it with a debt of \$18 billion, drove the city to bankruptcy, and put it under the supervision of an emergency manager (Davey and Walsh 2014).

In 2013, the median household income in Detroit was \$24,820 (compared to Michigan's \$48,273), and the childhood poverty rate was 58.6%, the highest in the country (Wisely and Tanner 2014). In this context, the city's water utility, the Detroit Water and Sewerage Department (DWSD), has experienced a steep decline in water demand and has been having trouble collecting enough revenue to run its operations. The solution adopted by the DWSD was to increase its tariffs, which made water unaffordable for many of its customers. In March of 2013, the DWSD announced that about 150,000 of its customers (almost half of its 323,900 user base) were delinquent and that it was going to start disconnecting the service for 3,000 residents each week, those whose payments were at least 60 days overdue or who owed more than \$150 (Hannon 2014). This was the first step towards trying to recover the \$118 million that the utility was owed, an effort that would also see water tariffs increase by 8.7% (about \$5) (Culzac 2014) even if water in the city was already twice more expensive than the country's average of about \$40 a month (Hannon 2014).

According to Amirhadji et al. (2013), affordability has not traditionally been a priority for the DWSD, and the efforts that it has made with regards to this problem have been insufficient given its magnitude. More recently, and in response to the controversy that its massive service

disconnections have generated, the DWSD has started to collaborate with other agencies in order to address the cases of the most vulnerable groups, but these initiatives are still in their preliminary stages (Eligon 2014). More telling is the fact that, despite the consequences and the outrage generated, the approach of cutting water off to delinquent customers has not changed.

A number of reports about the situation in Detroit have focused on the human stories of how vulnerable individuals deal with unaffordable water tariffs and service disconnections (Amirhadji et al. 2013; Circle of Blue 2014; Clark 2014; Ferretti 2014). They have provided evidence that many people who do not pay their water bills do so simply because they cannot afford to pay them, and that this is the last resort when no other options are available. They have also shown that water affordability is a real problem with serious consequences that go beyond a mere inconvenience. Amirhadji et al. (2013:31-36) summarize the effects of shut-offs as involving threats to health, to adequate housing, to family unity, to education, and to human dignity.

Another key element in the case of Detroit is the use of the ‘human right to water’ frame in order to make sense of the problem and to demand solutions. As mentioned above, until recently, the human right to water has mostly been invoked in developing countries, where the problems of water affordability are more evident and widespread. The taken-for-granted nature of access to water in wealthy nations has traditionally precluded appeals to the human right to water. Yet when in March of 2013 the DWSD began to ramp up its shut-off actions, local, national, and international activists responded by declaring that service disconnections go against the human right to water, and they appealed to the authority of the United Nations on the matter in order to put pressure on local authorities (Detroit Water Brigade 2014; Food & Water Watch 2014; Barlow 2014). In June of 2014, the United Nations Special Rapporteur on the human right to safe drinking water and sanitation, along with other special rapporteurs on related rights, released a statement arguing that service disconnections are an affront to human rights (Farha, Alston, and de Albuquerque 2014). A few months later, in October of 2014, the Rapporteur visited Detroit for two days as part of a United Nations human

rights delegation to assess the situation in the city (Burns 2014; Donnelly 2014; Lewis-Patrick and Cabbil 2014). After this visit, the Rapporteur reinforced the message of her previous statement, called the city to “restore water connections to residents unable to pay and vulnerable groups,” and urged the government to “adopt a mandatory affordability threshold” (Farha and de Albuquerque 2014). The scolding from the United Nations experts using the human right to water as a tool, which made national and international news (Gottesdiener 2014; BBC News 2014), contrasts with the attitude of the DWSD, whose public affairs’ office stated in a public event in June of 2014 that “the department does not hold the belief that water is a human right” (Jeffries 2014).

This conflict highlights the potential problems that water utilities can face to address affordability issues when they operate in a city with high levels of poverty and inequality. If the utility cannot (or does not want to) collect higher tariffs from affluent customers to subsidize poor ones, it finds itself without the tools to raise the resources that it needs to function. If it attempts to extract revenue from poor citizens, it is bound to have to disconnect the service and encounter resistance. This suggests the need to collaborate with other institutions and levels of government, but in the absence of state or federal regulations regarding water affordability and how to fund affordability programs situations such as that of Detroit are likely to continue to emerge.

The case of Detroit is an extreme one. Its magnitude and reach is certainly exceptional, but this does not mean that it is the only part of the United States where the affordability of water is a concern. Other cases have been brought up by a number of observers (Jerome 2014; Amirkhadji et al. 2013), and the evidence presented above for national level trends certainly shows that it is an issue that needs to be taken seriously. Given the traditional lack of attention to water affordability in wealthy countries, and the different circumstances that these present in comparison to the developing world, what should the next steps in order to research the topic be?

Conclusion: An Agenda for Research

The evidence presented in this paper shows that there are a number of gaps in the conceptual framework and the data that we currently have for the analysis of water affordability in the United States (and in wealthy countries more generally). There is sufficient information, however, to make the case for the importance of this problem and the likelihood that it will become more severe in the near future. If we want to understand water affordability issues and be able to intervene effectively to address them, we need to attempt to close those gaps. I present here an agenda for research to help us advance towards that goal.

First, we need better information on the situation of vulnerable groups for whom water affordability is a problem. We cannot merely rely on average water rates. There are several independent initiatives that collect water charges data from a number of utilities, but these do not focus on the whole range of tariffs for different types of customers, and they are not comparable to each other. In depth analysis of microdata from national surveys (such as those used in this paper) offer some potential and should be pursued more thoroughly. We also need data on water disconnections, which until now are very poorly understood. In this respect, the new variable included in the 2013 American Housing Survey for utility shut-offs is an excellent first step.

Second, we also need more information on how current affordability initiatives are working and what impact they have on beneficiaries. Given that these programs are adopted at the municipal level and under state regulation, this is a complex task that requires collecting data in a piecemeal fashion. However, it will be impossible to fully understand how water affordability problems unfold unless we are able to compare the effects of different forms of intervention. In a way, the diversity of initiatives used throughout the country provide us with a sort of natural experiment that can be used to assess effectiveness. Relevant dimensions to pay attention to in this kind of analysis include the size of water utilities, their urban or rural character, and their form of property (public, private, or mixed).

Third, we need to refine our conceptual understanding of what water affordability means and how different actors pursue it. As we have seen in this paper, water charges are usually set following ‘cost of service’ considerations, but there are other frameworks available, as well as the possibility of using different approaches in different circumstances and for different types of customers. In this respect, the use of the human right to water in Detroit raises a number of questions. Should we think about water affordability as an aspirational goal, or as an absolute requirement? If the latter, how much should it be codified in law, and how should authorities ensure that it is met? How should we measure it? And what implications does such a goal have for how utilities provide and citizens obtain water?

Fourth, and closely related to the previous point, we need to figure out how citizens see their relationship to water. Conceptual work on water affordability cannot ignore the ways in which people think about the resource. In developing countries, it is clearly established that water has cultural connotations that often affect its access and allocation, as well as the range of acceptable policies. In economically wealthy countries, and particularly in the United States, there seems to be an implicit acceptance that customers need to pay for the resource, and there has been a move to promote the ‘economic’ view of water, to use markets to allocate it, and to move towards full-cost pricing. But the case of Detroit shows that, when trade-offs between the economic approach and ensuring access to water emerge, people hold strong views that go beyond just seeing water as another commodity that can be dispensed with when it cannot be afforded, or for which large sums of money should be paid. What exactly are these views? What implications do they have for water management? How much variation is there? And to what extent are these views dependent on the specific situations in which they are deployed? We have very little information regarding these questions, and we need to be able to answer them if we want to understand the consequences of different water policies.

Fifth, and as a corollary of the previous point, we need a better understanding of the issue of nonpayment of water bills. The example of Detroit shows that some people cannot afford to pay for water. But we have seen that utility shut-offs take place for households with a relatively

high level of income, or for whom water rates represent a small percentage of their income. Does this mean that these people choose not to pay? Or are there any other hidden factors at play? What determines which utility bill will a household stop paying first? Is this merely a pragmatic choice (for instance, taking into account the consequences of not paying one or another utility)? Or are other considerations, for instance having to do with how people perceive their access to different services, relevant?

Finally, the issue of water affordability cannot be considered in isolation. It needs to be linked to problems of access to other utilities and public services, as well as other goods. It also needs to be connected with broader research on poverty and vulnerability. Are water affordability issues a dimension of poverty? Are they a marker of a particular form of poverty? Water affordability should also be put in the context of a broader discussion of the factors that prevent people's access to water, as it has been formulated for poor countries. How do water affordability issues intersect and relate to lack of access to water infrastructure, and to low water availability?

Water affordability has traditionally been ignored as a problem in wealthy countries, and particularly in the United States. However, it is increasingly becoming an issue for vulnerable groups, and it requires careful attention. This paper has presented an initial analysis of the problem, as well as an agenda for research to help guide us in our exploration of this issue. It is now up to researchers, public and private actors to follow up on this challenge and work towards ensuring universal access to our most precious resource.

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