

Chapter 18

How to Integrate Social Objectives into Water Pricing

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Abstract The social dimension should be addressed in the sustainability of water services provision, but it is less well studied than the economic and environmental ones. The debate between pros and cons of water privatization led the Organisation for Economic Co-operation and Development (OECD) to publish a seminal paper on social issues in water pricing, back in 2003. Relying on this document and other literature review, we successively present various solutions to support “water-poor” people in the payment of their charges: reducing bills for targeted populations (rebates, increasing blocks), supporting the income of targeted populations, reducing bills for all customers, and reintroducing taxation as a source of income. A general outcome is that social tariff design entails administrative costs that may offset the benefits it is supposed to generate. Lastly, we advocate the development of new software to assess the redistributive effects of ongoing tariffs, and tariff changes between categories of residents and with the water utilities’ capacity to invest.

Keywords Social tariffs • Water and sanitation • Tariffs taxes transfers • Macro-affordability • Micro-affordability

18.1 Introduction

While at the end of the twentieth century the issue of the “water-poor” people¹ and the right to water was considered “solved” in developed countries and only an ongoing problem in developing ones, a sort of backlash occurred after the debate roared between supporters and opponents to “water as an economic good,” privatization, and full cost pricing; starting with England and Wales and, soon afterwards, in

¹Water-poor here refers not to countries or regions but to people who experience difficulties in paying their water charges.

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France, the question of water charges/bills affordability was raised. However, this area remains the least studied among the issues of sustainable water management. Only in 2002, in the aftermath of full privatization of water services in England, Fitch and Price started to calculate how many people as a result would pay more than 3 % of their revenues to access water. This chapter aims at presenting the various solutions adopted in developed and emerging countries to support cheaper access to potable water and sanitation for low-income families or targeted social groups; it deals only with residential water charges. The review of previous publications on this subject shows that it is a much more complex issue than what water services managers and local politicians have thought.

18.2 The Emerging Social Issue in Water Supply and Sanitation (WSS) Services

In the second half of the twentieth century, an increasing number of cities in the developed world opted for volumetric pricing of potable water, considered as a public service with commercial character.² The objective was to recover as much of the total costs as possible from the beneficiaries of the service. In addition, wastewater collection and treatment, which was previously considered as imposed on citizens for the sake of public health protection and then funded through local taxation, was considered as a service rendered, so it was added on top of the water bills. The price to pay for water services then progressively doubled. In Europe, WSS services became clearly more costly after the adoption of the Urban Waste Water Directive (EC 271/91).³ All of these evolutions brought the increase in water consumption by various users to a halt and to a reversal: industry decreased first but, soon, residential customers also adopted water conservation measures. The decrease in potable water demand is now a well-known phenomenon in many European cities, and beyond a certain point, it does embarrass water supply operators, who rely on water bills to cover their fixed costs: less water sold means less revenues, while the infrastructure imposes a long-run fixed cost. The consequence of demand decrease is often unit price increase. And, in turn, overall price increases tend to hit poor families in the persistent economic crisis society faces. The social dimension of sustainability is now on the political agenda in several countries: opponents to “water as an economic good” are powerful enough to bring elected politicians to question full cost pricing, in particular, concerning the emerging category of the “water-poor” in developed countries. Many attempts are made in various countries to address this issue.

²In France, administrative law distinguishes public services that render a service to some beneficiaries, who then should pay for their use through billing, and other public services, called administrative, the cost of which is borne by citizens through taxation.

³The European Council Directive 91/271/EEC concerning urban wastewater treatment was adopted on 21 May 1991. Its objective is to protect the environment from the adverse effects of urban wastewater discharges and discharges from certain industrial sectors. See: http://ec.europa.eu/environment/water/water-urbanwaste/index_en.html

The Organisation for Economic Co-operation and Development conducted a survey on social issues related to water pricing (OECD 2003). Among other things, the OECD reviewed various methods used to cover bills in arrears or to support bills of the poorest families in various countries. The OECD usually supports full cost pricing of water services and its commercial or private law status. But, more recently, it has admitted the necessity of some taxation mechanisms and, of course, transfers from donors, to alleviate the impact of water tariffs on customers (the 3Ts approach).⁴ The 2003 report is a landmark in the recognition of the social dimension of sustainable WSS services management. Most of the report is devoted to the affordability of water services. Indeed, water prices rose drastically in the 1990s, and this trend is estimated to continue, so that the social issue will necessarily remain. The OECD taskforce tried to develop an indicator, called macro-affordability, based on the ratio of average water charges to the mean aggregated household revenue or to the mean aggregated household expenses. It also developed an indicator of micro-affordability, this time looking at the impact of water expenses on various income groups, family sizes, and regions. To support its objectives, OECD justified metering as the basis of economic rationalization:

The trade-off between efficiency and equity objectives in the provision of household water services typically occurs when moving from an unmeasured to a metered charging structure, when rebalancing tariffs away from fixed charges toward volumetric charges, and when increasing fees and tariffs toward full cost pricing. There is considerable experience in OECD countries with policy measures to address water affordability for vulnerable groups, while attempting to make water pricing reveal the full economic and environmental costs of water services. (OECD 2003, p. 12)

According to OECD, supporting measures for the poorest families can be grouped into two broad categories: those supporting revenues of targeted households, and preferential tariffs. The first group of measures includes social subsidies, vouchers, fractioned payments, and debt forgiveness. In the second group, preferential tariffs are meant to keep water bills below a certain fraction of revenue (e.g., 4 %). They include keeping water charges under a threshold, and increasing block tariffs.

In other words, for cases in which water service costs should be covered mainly through billing, one could either lower the bills of some category of users, at the expense of other users (or of the self-financing capacity of the service provider) or support the poor by helping them financially to pay their bill as the other customers. To provide a complete picture of actual situations, we also want to present cases in which part of the full cost of WSS services provision will not be covered by the beneficiaries, but by general budgets (i.e., taxation of citizens). One must indeed remember that if a service lowers the bills for all customers, automatically the percentage of families paying more than 3 % of their revenues for water will decrease. However, at present, water supply utilities seldom test the real redistributive impact of their ongoing tariff or of a proposed tariff change. Authorities in charge usually have their preferred solution to address the issue, and they publicize their choice so as to gain political legitimacy, but they frequently fail to see that the issue is more

⁴The 3Ts are tariffs, transfers, and taxes.

complex than they think and that tariffs may have counterintuitive effects. We discuss this and propose a simple tool to evaluate redistributive effects of tariffs at the end of this chapter.

18.3 Reducing the Water Bills for Targeted Populations

The first possibility is to offer some kind of bill reduction to some customers like disabled, retired, unemployed, living on benefits, etc. However, this section only applies to utilities that charge their services through some volumetric measure. It does not apply for instance to the majority of British water users who remain unmetered to this day or to Dutch wastewater collection, which is paid via real estate taxes, etc. In other developed countries or cities (France, Germany, Boston, and, recently, New York and Chicago), metering has been applied, but only at the property level (i.e., with only one meter per building). The collective bill is then allocated between residents on various bases: apartment surface area is quite common, but submetering is also frequent. In those cases, it is more difficult for water authorities or operators to subsidize targeted residents' water bills.

18.3.1 Rebates on Water Bills

The OECD 2003 report mentions various examples of rebates on water bills. In Australia, a system of identification (ID) cards giving the right to reductions (called concessions) was developed. It initially targeted single-family house owners who had become modest retired occupants but was extended in various ways by the various federated states that are in charge of social issues. Victoria's initiatives resulted in reducing the average water bill by a quarter, addressing up to 30 % of households. Additionally, in the same state, a special subsidy fund has been set up to support WSS subscribers undergoing unexpected difficulties (job loss, divorce, costly illness, and, eventually, consequence of an internal water leak). Demands are treated on a case-by-case basis, and in 2001, they included 12/10,000 customers.

Other studies (e.g., Smets 2003) indicate various possibilities to reduce bills altogether or wave part or all water bills in arrears, on the basis of a special fund generated by the operator for all water bills. A tiny increase in the per m^3 price can generate a substantial funding system for that purpose. In Belgian Wallonia, for instance, a little more than 1 eurocent per m^3 is added onto water bills to generate a fund to support the "water-poor" program. It represents 0.3 % of the total average bill and helps support around 10,000 customers per year (of an estimated total of 120,000 water-poor customers), with an average support of 200 €/customer (AquaWal 2009). In France, there is a support system designed at the county level, called solidarity fund for housing (FSL), in which public housing managers, county council social services, electricity, gas, and water utilities give various amounts of

money to allow waving either unpaid rents or charges or bills. This is done on a case-by-case basis and is mainly concerned with temporary difficulties (not structural ones). In Scotland, water bills are systematically capped at 3 % of household's income. One difficulty with all these support schemes is the information needed by the operator or authority providing the service to identify the beneficiaries. In the United States, for instance, an electricity bill support system remains unused by most potential beneficiaries who are not aware or not willing to claim support. Usually these support systems require the use of other existing databanks on people who are poor or having difficulties (e.g., social services in local authorities, family benefits (CAF)⁵ at the county level in France, national family fellowship in Brazil (bolsa familia), so as to reduce the cost of information. This gives an argument to WSS management associations like AWWA⁶ in the United States, promoting a general support mechanism "outside the bill" (AWWA 2004). In developing countries, it remains particularly difficult to bring support to the significant fraction of the population that is not connected directly and has to carry water away from a well or a stand pipe. Water ends up far more expensive for them, usually.

England and Wales offer a special case, since water companies are not allowed to disconnect customers with bills in arrears. This has generated a dramatic increase of bills in arrears and on the duration of these arrears. Negotiations result in other solutions, like frequent (weekly or fortnight) billing, reduced water pressure (flow restrictors), and even prepaid water meters (working with coins or chip cards). The latter have, however, been banned. Conversely, their use was upheld by the Constitutional Court of South Africa.

Olivier Coutard (1999) proposes a typology of three groups of water indebtedness treatment:

1. No water consumption reduction, no bill waving, and household remains fully responsible. The company accepts some delay in payment by spreading the bill in arrears over time or changing frequency of billing.
2. No water consumption reduction, but rebates offered on the tariff or on the total bill.
3. No rebates on bills, but water consumption reduction.

New York City offers an interesting example for the third group above: under pressure by the Environmental Protection Agency (EPA) to improve the efficiency of wastewater treatment, in order to reduce excess water in drains, the city decided to introduce metering, but only at the property level. In many cases, poor leak control in condominiums would result in much higher water charges when shifting from the previous rate system to the volumetric payment. The city then offered to keep the bill at previous level during 2 years, giving some time for building residents to track and control leaks and replace inefficient appliances. Additionally, for specific places in which residents were identified as "poor," the city would bring subsidies to support leak control investments.

⁵Caisses d'allocations familiales—family benefits fund (benefits for low-income families with two children or more).

⁶American WaterWorks Association, the most important association of drinking water providers.

18.3.2 *Increasing Block Tariffs*

A different approach to redistribute water costs among users is to use increasing block tariffs (IBTs). Although the OECD acknowledged that some metering, plus IBTs, may have regressive effects on large, poor families, it claimed that “the design of increasing block tariffs can be adjusted in several ways to make the sizes and prices of tariff blocks deliver the intended distributive effects” (OECD 2003).

The first rationale for introducing volumetric payment of water and, additionally, increasing block tariffs (IBTs) is efficiency in use and demand management. But there is another argument: equity. One can indeed argue that even if elasticity of consumption to price is small, and IBTs have complex consequences, they may still be justified in terms of utilities getting higher revenues from users who generate a costly peak demand. Additionally, on moral grounds, most people support that water wasters should pay: metering and IBTs would then firstly be advocated in terms of consumer justice. But some also consider social justice: initial cheaper volumes would make water less expensive for the poor. And, indeed, in several studies, elasticity of water consumption to revenues is higher than to prices (see also the chapter by Barr and Ash in this volume).

In Brazil, most state water companies (CESB)⁷ and many municipal or private water suppliers offer a cheaper initial volume of water to targeted populations, combining a rebate system and IBTs: typically, families identified as poor (e.g., receiving only one wage under the social minimum wage level), or on benefits (bolsa familia, state or municipal social support, etc.), or living in small homes (less than 60 m²), or consuming little electricity (less than 200 kwh/month), will get an important rebate on the first 10 m³/month (eventually 15). Beneficiaries must prove their eligibility every year or so (Britto 2015).

Some researchers challenge this claim of redistribution in favor of the poor, in particular in a developing country context. Boland and Whittington (2000) think that “this type of tariff deserves more careful attention. Even at first glance, the consensus appears somewhat curious because, although IBT structures were first designed in industrial countries by providing revenue-neutral cross-subsidies, only a small minority of water companies in countries like the United States now use them. Water and sanitation conditions may help explain the fact that IBTs are increasingly popular in developing countries, but this is not obvious. In many cities in developing countries, most poor households do not have private metered connections to the water distribution system, and thus IBTs do not help them” (Boland and Whittington 2000, pp. 215–216).

After careful examination, they conclude that “IBTs introduce inefficiency, inequity, complexity, lack of transparency, instability, and forecasting difficulties.... Every claimed advantage of an IBT can be achieved with a simpler and more efficient tariff design: a uniform price with rebate” (ibid). They argue that rebates can be targeted to low-income customers, provided the information on who belongs to

⁷Companhias Estaduais de Saneamento Básico.

this category is available. Komives et al. (2005) also draw from their experience in developing countries that IBTs have, in fact, regressive effects, because poor households are often large ones, so their consumption ends up in the upper blocks. It is, for instance, the case in South Africa, where the government's decision held in 2001 to provide a basic amount of water, free of charge, to all citizens was translated into 6 free cubic meters per household (in fact per subscriber and then behind him sometimes many households) and per month (Smith 2012; Burger and Jansen 2014). This tariff was challenged in the court by Soweto residents, who previously had access to unlimited water from standpipes against the payment of rates. After a long battle, the amount of "free basic water" was set at 42 m³/month, which jeopardizes the capacity of water services to cover their costs from the users.

However, one could argue that these conclusions may not be valid in developed countries. Indeed, in parts of Europe, almost all households are connected to water supply systems, so that issues identified by Boland and Whittington regarding charging for collective consumption (e.g., villages depending upon standpipes or connected subscribers reselling water to poorer neighbors) do not occur. Yet, in many European and American cities, the meter used for billing is a collective one, so that it is difficult to apply a progressive tariff without additional information, typically the number of persons or apartments behind a meter. Where metering is collective and indoor water use is both moderate and inelastic, IBTs may well end up as a useless complexity, at least in condominiums.

In Barcelona, the superimposition on water bills of the sewer charges, plus a levy for environmental protection, was to be compensated by a growing block tariff system. But since this tariff was designed per meter rather than per capita, large families in the suburbs suffered dramatic bill increases, and they went on bill strike and to court, where they won and forced the Catalan water agency to redesign the tariff (Domene and Sauri 2012). In Belgian Flanders, the desire to implement the spirit of the Rio 1992 right to water declaration led to introduction of a tariff with an initial free volume of 15 m³/year/capita. The information of the number of people behind meters was available. Yet, an ex post study (van Humbeeck 2000) showed that the redistributive effects were paradoxically negative for the poorer families. Boston, Massachusetts, is a very interesting example of collective metering through smart meters and progressive tariffs, which apparently brought water consumption to be much better controlled. Residents and building managers provide information on the number of residents per meter to the Boston Water and Sewer Commission, which allows setting the blocks on a per capita basis. However, to this day no social impact study has been made, and it remains to be seen whether the success in demand management is due to the tariff or to the interaction between the utility and the customers using smart metering systems.

In France, IBTs appear as an attractive formula to support water conservation and consumer justice. However, in most cities, metering is performed collectively for condominiums. And protection of privacy led the courts to deem it illegal for a utility to know how many people live in a housing unit that is being metered. Additionally, large water companies like Veolia have been able to calculate the extra cost they face when they have to meter and bill each apartment separately, and the

result is adverse: namely, the additional information obtained through individual billing of apartments is not worth the cost (Barraqué 2011). This is why Veolia usually prefers to support the income of customers or give rebates rather than adopting growing blocks (see below). Lyonnaise des Eaux, another water company, supports another solution: IBTs are implemented in condominiums with collective metering, so the company sends only one bill to the building managers, but each apartment pays the same fixed part as a single family, and then the tariff blocks are multiplied by the number of apartments in the building.⁸ Then it is possible to experiment with the combination of increasing block rate tariffs with social rebates: in Dunkerque, Lyonnaise des Eaux, refined its IBT tariff: for a single-family house that receives a separate bill, the first block, up to 75 m³/year, is supplied at 0.80 €/m³, and for families on benefits (CMU-C⁹ in French), the price goes down to 0.30 €/m³. The second block, up to 200 m³, costs 1.50 €/m³ for every user (regular or on benefit families). Additional consumption above that threshold is billed at 2 €/m³. There are no social rebates for upper blocks. As for condominiums, since it was considered illegal to use data on family sizes, instead of setting the blocks per capita, these figures are multiplied by the number of apartments behind a meter, irrespective of the number of residents in each apartment. It is left to the building managers, who have to pay the collective bills, to allocate their bill among the resident families. Some will use submeters, others will calculate the cost according to the surface area of the apartments. It remains to be seen how this social tariff will perform in terms of social redistribution: will managers in turn give a rebate to those resident families that are eligible for a first block with rebates?

18.4 Supporting the Income of Targeted Populations

Many utilities argue that the social dimension of water services should be handled separately or as AWWA (2004) suggested, “think outside the bill.” In downtown areas in particular, where water is paid in addition to the rents, it is much easier for tenants to pay a fixed charge for their water every month with the rent than a randomly sent variable bill. And when they cannot pay, they may need global support for the rent and general charges rather than for water alone.

One option is to get water suppliers, as well as electricity or gas suppliers, to give a small percentage of their turnover to a social housing fund, as is the case in France. The fund operates at the county level, since county councils are in charge of social and sanitary affairs. One of the problems is that this funding can only help people who are temporarily unable to pay. It is more difficult to support people who are in need but do not receive bills directly.

⁸Typically in Libourne, a condominium with 100 flats would replace the collective meter subscription of 200 €/year and a uniform variable price, by a fixed part of 100 × 15 €/year, and a first block of 100 × 15 m³ at the “essential good” price of 0.1 €/m³, etc.

⁹CMU-C means *couverture maladie universelle complémentaire*: these families get full social security coverage.

So, the best argument of those who favor income support is that as long as the percentage of people who cannot afford the bill is small, there is no need to create a sophisticated tariff. Social services should use municipal general budgets, or earmarked funds, to solve bad debts cases. Another option is to identify poor water users and offer them vouchers. It is implemented in France through “personalized water cheques” (coupons). They are being used as an experiment in the largest water supply utility in France, the Paris suburban SEDIF. Typically, a family of four with a yearly income of 12,000 € may have an average water consumption of 120 m³/year and then, if billed separately, pay 380 €/year (sewer service included), i.e., more than 3 % of its income. This family would then be entitled to a yearly water coupon of 100 €. For those who live in condominiums and do not receive a separate bill, the support is channeled through the social support services of the concerned municipality.

A similar scheme is used in Chile: no water tariff for poor initiated by utilities, which were privatized during the dictatorship era, but municipalities are rather left with the task of identifying the poor water consumers and support them financially from a national fund allocated between them by the central government (Pflieger 2008). Families receiving the largest subsidies must still pay 15 % of their bills. Municipalities have difficulties in identifying the eligible households, and many errors are reported (Britto 2015).

According to OECD, in Finland, water charges are included in housing rents and are eligible to some support. Apparently 7 % of the households are concerned, and the support cannot go above 80 % of eligible charges. There is a minimal charge that all households must pay.

In the United States, according to AWWA (2004), adopting a system of vouchers to support payment of water services is under discussion, but it is not simple. Indeed, these vouchers could interfere with other forms of social support. In particular, the related artificial income increase might cause poor families to lose their eligibility to general rent support. In the end, only a minority (13 %) seem to offer rebates. Some waive the fixed part, and others give a rebate on variable parts or have set up “lifeline” prices for minimal volumes. Social support then usually comes from outside the bill, when it exists.

In most European Union (EU) member states, support for the water-poor is primarily left to municipalities or local public authorities. This is the case in particular when WSS services are provided by commercial utilities that consider it not their role to get involved in social support.

Centralization of water regulation in England and Wales is conversely translated into a national system for water-poor support. All poor or “incapable to pay” households are on benefits, i.e., they receive a financial support indexed based on the cost of living. Before 1989, water rates were eventually covered directly by a social support system. After the privatization of water utilities in 1989, benefits were added as a supplement to cover water expenses. But the price increase that followed was much faster than inflation, so that after 8 years, this fraction of benefits corresponding to water represented only 69 % in real terms of what it was in 1989. This probably added to the general discontent of British citizens with full privatization of 1989.

18.5 Reducing the Bills for All and Reintroducing Taxation

Against the objective of the 1990s, several international institutions have de facto shelved the project of full cost recovery. It is obviously the case for developing countries in which initial infrastructure finance needs taxes and transfers to avoid unaffordable water bills or charges. In France, for instance, back in 1954 a special national fund was created through a piggyback tax levied on all water bills (1 cent on each m³). The funds were doubled with a tax on horse races bets, and this provided up to €300 million per year. Money was allocated at the county level exclusively to support the extension of water systems in the countryside. This was necessary, since France remains a low-density country with scattered housing. Yet today above 99 % French homes are connected, and the country has to maintain up to 950,000 km of water pipes in the long run. It will probably not be possible to do it solely with an increase in billing. In neighboring Italy, a long tradition to fund infrastructure through general local budgets supported by government grants results in the lowest average water price among EU member states, and it turns out impossible to stop the subsidy system to avoid having high water prices. This is politically impossible and would be in any country. Conversely, such low water prices result in a quasi absence of a specific water-poor issue.

Typically, in Portugal, in 1974 when the country returned to democracy, connections to WSS services were no better than in Brazil, despite the huge difference in rural-urban migrations. But the country did set up a dedicated national water company to channel the important subsidies coming from EU's cohesion funds. The resulting "public-public partnerships" allowed the country to catch up with the richer member states at an affordable price for water users.

The Netherlands offers a fascinating case at the other end of WSS services costs and turnover (on the high side): the Dutch pay potable water through volumetric water bills to a commercial utility owned by a mix of municipalities and provinces; they pay wastewater collection to their municipality through housing and land taxes, and they pay for sewage treatment to the institution in charge, which is one of the famous water boards, historically created to protect against seawater flooding and river flooding, and to drain the lowlands. Payment is by family: each family pays for three members irrespective of the number of family members, except single persons, who pay for one. Overall, this financing system spreads the high cost resulting from living lower than sea level in three different tiers and makes it both more affordable and acceptable. Paying for wastewater services through local rates is usually redistributive in favor of the poorer households, who live in less valuable homes, and the family tariff clearly favors large families. Yet there is no available analysis of the de facto redistributive effect of the global system. Water bills are sent individually to each household, even in condominiums, so it would be possible to develop redistributive formulas. But the Dutch are reluctant to do this. Water bills have to be paid, and in the rare cases when they are not, social services get involved. For wastewater, which is covered by taxes, families under a certain level of revenue are exempted. And the water boards exceptionally give rebates to poor people or to

students. The overall philosophy is not to discuss water charges redistribution too much, but rather to keep the various charges paid by the population as low as possible. Hence, the benchmarking of water supply utilities, and water boards, systematized in recent years.

Many of the above remarks on indirect support of water-poor people through taxation apply to the majority of English water users who pay by rates (i.e., with some redistribution between rich and poor households via renting values).

In France, water price increases, due to the implementation of European directives (in particular Urban Waste Water Directive, EC 91/271), have led to the development of a national debate. Even the lobby of water supply companies and national representation have discussed the possibility of reducing the total bill through removing some of the elements from the bill. For instance, it has been advocated that under French institutional setup, public services with economic character should be covered by their beneficiaries, and, conversely, economic intervention of the public sector with no service rendered should be taxed and not charged through bills. Water supply has always been considered as a service, so it has been billed; sewage collection initially was mandated, so it was considered as a tax (housing/land tax) until 1967. Then it was considered that since all urban citizens were connected to sewers, one could consider wastewater collection as a service, so it could be transferred on water bills and paid by volumes. This allowed adding up the levies to be paid to the Agences de l'eau (water agencies) onto the water bills. However, the pollution discharge levy was originally used to fund the construction of sewage treatment plants, and these do not render a service to the sewer-served population but to downstream riparians of the water body. Therefore, there is a rationale to remove this part of water charges from bills and transfer it to local taxation. This would automatically reduce the percentage of people paying more than 3 % of their revenues to get water services.

18.6 Improving the Assessment of Water Tariff Redistributive Effects

The water-poor debate calls for a more important involvement of water utilities in the social dimension of water charges and a general reflection on the distributive effects of tariff levels and structures. This is still a relatively unexplored territory. Now that the water-poor notion is acknowledged, utilities are more or less forced to find alternative ways to address the situation.

In developing countries, the largest social issue is linked with the relatively low level of connections to water services: non- or poorly connected households are not really known by the authorities and the operators, so they may end up paying much more for the same quantity of water, or else they have illegal connections that jeopardize the reliability of the networks. Paradoxical situations also occur: in Rio de Janeiro, for instance, "favelas" (slums) get some form of collective water at reduced

prices, because they are favelas. But in the outer periphery of this immense metropolis, there are thousands of families that are poorer than favela residents and who are not registered as poor and thus do not receive support. Any project to improve social access to water must then go through a real field survey and through residents' involvement in the issue.

But it seems to be the case also in developed countries: the level of connections is very high, but authorities and operators in fact know very little about what people do with tap water, and what is going on beyond the meter. For lack of socioeconomic analyses, they tend to indulge in simplistic considerations, like "water is a market good, so the rich can buy more than the poor, so if we charge the high level consumers more, there will be a redistributive effect in favor of the poor." Unfortunately it is not so simple, and real field assessments need to be done, starting with the distributive effect of fixed parts that are quite frequently used.

In a project funded by the French National Research Agency,¹⁰ our partnership¹¹ decided to build upon the seminal approach developed by Fitch and Price (2002): their indicator for water affordability is the percentage of people who pay more than 3 % of their income on WSS services. This indicator can be supplemented by another one: those who pay less than 1 %. In turn, these two indicators can be calculated for a three-dimensional matrix, with deciles of income, number of persons behind the payer, and a proxy for water consumption habits (thrifty-average-hedonist). A similar approach has been used by Rajah and Smith (1993) in the United Kingdom and by P. Van Humbeeck (2000) in Belgian Flanders. It would be very useful for water utilities and authorities to use such tools to simulate and anticipate the potential impact of tariff changes on various categories of water users in practice. But additionally, this tool should calculate how much money is left at the end of the year in the cash flow of the operator to fund the long-term maintenance of the infrastructure.¹² The overall idea is that, since WSS services are a fixed cost industry, with frequent mandate for operators to balance costs with revenues from users, there is a zero sum game between various categories of customers and the operators' interests. This tool also allows for better assessing the real impact of a tariff change.

Thus, we have discovered that some new tariffs based on increasing blocks were not favorable to lower income populations, for the very reason (but counterintuitive for many decision-makers) that the additional administration costs of such tariffs led to everybody paying more to the operator. This is why one must first recommend to keep the water pricing simple, so as to reduce the transaction costs associated with the tariff. Social objectives are in the end better handled outside the tariff through income support for the poor. In particular, water poverty in extreme cases

¹⁰ Within a sustainable cities program, this project dealt with the sustainability of water services in large cities. See <http://eau3e.hypotheses.org>

¹¹ The project was coordinated by B. Barraqué and involved seven partners, including Marielle Montginoul, and the public water supply utility of Paris.

¹² Such a tool is being developed by Ms Marie Tsanga Tabi in the Strasbourg research laboratory GESTE in ENGEES (Ecole Nationale du Génie de l'Eau et de l'Environnement). It is presented in the project's blog: <http://eau3e.hypotheses.org>

(homeless people) requires solutions completely out of the redistribution debate: in France, and we suppose also in other developed countries, one can find “water associative houses,” in which deprived people can wash, clean their clothes, get support for other needs, and recover minimal dignity.

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