



URBAN WATER *conflicts*



**An analysis of the origins and
nature of water-related unrest
and conflicts in the urban context**



United Nations
Educational, Scientific and
Cultural Organization



International
Hydrological Programme
of UNESCO

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PREFACE

The Secretariat of the United Nations Educational, Scientific and Cultural Organization's International Hydrological Programme (UNESCO-IHP) is extremely pleased to present the publication, *Urban Water Conflicts: An analysis of the Origins and Nature of Water-related Unrest and Conflicts in the Urban Context*. It is a product of the urban water management projects being implemented under the Sixth Phase of IHP (2002-2007), and it represents a joint effort with the IHP project, From Potential Conflict to Co-operation Potential (PC→CP), which addresses water conflict prevention and resolution.

This collection of essays is a new and systematic effort to survey the controversial aspect of the management and, in many cases, mismanagement of freshwater resources in an urban setting. It addresses and characterizes the conflicts that arise within large human settlements, due to the economic and social implications of access to and the use of basic water services. It also presents in-depth case studies from cities of various continents. One prominent aspect of urban water issues is that, in contrast to agricultural, industrial, hydropower, ecosystem maintenance and recreational freshwater uses, water stress in the urban environment manifests itself directly at the household level, where the consumption of domestic potable water takes place, and where the consumer is normally subject to charges for it.

These essays are particularly relevant in a time when the world is becoming increasingly urbanized. Current projections predict that by 2007 half of humanity will live in cities, meaning the planet will have an urban majority for the first time in history. There are other political, social and economic processes at work, not the least of which has been the trend towards privatizing water services, which is of particular relevance to the analysis of urban water conflicts.

This publication is the collective effort of numerous individuals. In particular, we would like to acknowledge Mr. Bernard Barraqué, Chairman of the French IHP National Committee, senior researcher at the National Centre for Scientific Research (CNRS) in Paris and chief coordinator of IHP's Urban water conflicts Project, as well as Prof. Evan Vlachos, Colorado State University, who initiated and followed up the project.

We would also like to acknowledge the members of the project's working group, who have generously contributed to the collection: Bernard Barraqué, Petri S. Juuti, Tapio S. Katko, Christelle Pezon, Ana-Lucia de Paiva Britto, Ricardo Toledo Silva, Sarah Botton Gabriela Merlinsky, José Esteban Castro, S. Janakarajan, Marie Llorente, Marie-Hélène Zérah, Karen Bakker, Antonio Massaruto, Markus Wissen and Matthias Naumann.

At the UNESCO Secretariat, the following people were involved in the project: Mr. José-Alberto Tejada-Guibert, Deputy Secretary of IHP, officer in charge of the IHP Urban Water Management Programme, under whose responsibility this project was carried out, with the support on Consultants Ms. Biljana Radojević and Mr. Wilfried H. Gilbrich. Mr. Sean Lee did the final editing of the text.

The community of nations has embraced the Millennium Development Goals, which call for halving the proportion of people without access to safe drinking water and basic sanitation by 2015. This collection's ultimate aim is to be a useful tool in this global initiative. As such, we trust that this publication will prove useful to urban water policy-makers, decision-makers, planners and managers throughout the world. As this is a continuing effort, we would highly appreciate your comments and feedback, which may be sent to the address on the cover.

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Urban Water Conflicts

Introduction

Bernard Barraqué, DR CNRS, France

Origin of the UWC task force

In November 2002, the newly created UNESCO-IHE Institute for Water Education (formerly known as the International Institute for Infrastructural Hydraulic and Environmental Engineering) centre in Delft, The Netherlands, hosted an international meeting entitled, 'From Conflicts to Co-operation in International Water Resources Management: Challenges and Opportunities'. This was the first and most important conference to date of the From Potential Conflict to Co-operation Potential (PCCP) task force on water conflicts, which is sponsored by UNESCO's International Hydrological Programme (IHP) and the United Nations' World Water Assessment Programme (UN-WWAP).¹

A wide array of themes and subjects were covered, but as could be expected the conference focussed chiefly on international water conflicts and transboundary rivers and aquifers. Specific attention was also given to the problems of access to and affordability of water services in cities (the right to water); the public/private issue; and the environmental footprint of urban water on large cities' hinterlands, dealing with rainfall and runoff. Under the leadership of Evan Vlachos (Professor of Sociology in Civil Engineering, Colorado State University) and Jan Lundqvist (Water and Environmental Studies Department, Linköping University), a task force was initiated to prepare a separate report on these issues.²

Between the November 2002 conference and the following meeting, in July 2003, Evan Vlachos put together a collection of press articles and research material on urban water conflict or unrest, which he grouped into six different categories: population growth and hyper-urbanisation; poverty and North-South disparities; globalization and privatization; scarcity and stress;

¹ Proceedings of this meeting were published under the *IHP VI Technical Documents in Hydrology*, PC-CP series, No. 31.

² Lundqvist, J., Appasamy, P. and Nellyat, P. 1996. 'Dimensions and approaches for third world city water security'. *Philosophical Transactions of the Royal Society*, Vol. 358, No. 1440, pp 1985–96.

competition between sectoral demands; and transboundary interdependencies. Evan has since expanded this documentation task. The resulting material is highly valuable and should be made available to a large readership (at least in the form of a bibliography). The task force decided to synthesize this material with the personal input of task force members into a single report.

In the meantime, two other groups of urban water experts have been created: the 100 European Scientists in the European Network for a New Water Culture (EUWATER), which is an expansion of the Iberian group, the New Water Culture Foundation to include all of Europe, and the international Reflection Group on Changing Network Service Provision and Urban Dynamics, which studies the link between urban socio-economic fragmentation and established and new forms of urban service provision. The combined breadth of experience these groups represent has provided a great range of case studies and invaluable knowledge of various approaches to these issues.

The enlargement of the first group combined the networks established by the initial Iberian foundation with the Eurowater network and the environmental sections of Oxford University's school of Geography and the centre for Science, Technology and Society at the University of Twente in the Netherlands. While this group deals primarily with sustainable water resources allocation, including social, political and ethical dimensions, its *Declaration for a New Water Culture* also covers issues of service provision, even though consensus has not been reached on the possible role of the private sector. The second group was jointly developed by Laboratory of Technology, Territories and Societies (LATTTS), a mixed entity that brings together researchers from France's National School of Bridges and Roads (ENPC, *Ecole Nationale des Ponts et Chaussées*), the National Centre of Scientific Research (CNRS, *Centre National de la Recherche Scientifique*) and the University of Marne-la-Vallée, and the Wagner School of Public Services of New York University. It also includes people who deal closely with conflict issues related to globalization and commodification, both in developed and in developing countries, in the field of urban services in general.

Benefiting from these two networks of colleagues, along with the initial UNESCO drafting group, we were easily able to gather skilled and dedicated participants who could quickly write case studies on particular urban water conflicts. This document is composed of case studies, on cities or countries as a whole, that came of this collective effort. To prepare case studies of urban water conflict necessitated some agreement on what such conflict entails. In a meeting on 27-28 June 2005, participants presented their visions of what urban water conflict is, which provided a rich common background for the task force.

Definitions of urban water conflicts

A list of the causes of conflicts or unrest should take the sometimes stark differences between urban settings into consideration. Indeed, part of the difficulty of working on urban water issues comes from an inappropriate amalgamation of very different situations in developed and developing countries: commodification, i.e. the commercial character of the service, is widely accepted in Europe, whereas it is hotly debated in countries where a significant portion of the population cannot afford to pay for services. Another situation involves cities in countries that were formerly part of the Soviet Union or under its influence. These cities are experiencing dramatic changes in funding capacities, which make it difficult to maintain and modernize their often oversized infrastructures. (This situation might also arise in cities in developed countries, as the main issue is long-term maintenance and ageing infrastructure.) While it might be possible to

reduce the associated costs using recent advances in the fields of environmental engineering and the social sciences, reaching a better state of equilibrium in the urban/nature relationship through new technology and territorial management strategies will likely involve conflict. In developing-world cities, on the other hand, the major issue is the impossibility of readily expanding networked collective services to poorer neighbourhoods, for a lack of capacity and solidarity, and analysis of what can best be done instead is vital. Mediterranean European cities fall somewhere in between these different categories, with unfinished sanitation connections and a strong tradition of State hydraulics that results in low prices. This has led to the development of irrigation, competing with urban water needs. In post-communist states, an important issue is the marked reduction in water needs, which often entails a strong decline in the quality of water services or a dramatic price increase.

It is difficult to make a precise list of the causes of urban water conflict, but they usually involve the following:

- quality/extension of drinking water services and their continuity
- quality/extension of waste-water collection and treatment
- urban hydrology problems (storm water control)
- impact of large cities upon their environment, in particular water resources use and misuse
- financing of investments issue
- tariff setting and cost recovery
- degrees of freedom left to urban dwellers *vis-à-vis* the services provided.

After developing a comparative and historical approach to water services provision, it is important to stress the changing nature of conflict over the decades, in line with a changing technological, economic, political and social context. Several contributors also found it very important to explore changes over time. The European experience can be analysed as one where private companies invented the piped water service, but the role of local authorities soon proved to be essential. As Tapio Katko and Petri Juuti from Finland were thinking on similar lines, they decided to write the first contribution to this report together.

Conversely, Christelle Pezon focuses on those conflicts that had to be tackled by the courts, reflecting primarily on the legal relationships among the actors concerned with the delegation of public water services to private operators, including municipalities, customers, operators, eventual regulators in government, and third parties. Pezon illustrates the changing nature of conflicts in the century-long period of their development, primarily through a historical survey of administrative Supreme Court (*Conseil d'Etat*) cases in France: how the courts resolved these conflicts shows what the dominant solutions to such issues were and how governance translated their viability. Pezon also assesses the possibility of generalizing this analysis to other legal contexts, particularly given that the French model of public service delegation has been debated and experimented with in various other countries.

Some participants in the June 2005 meeting, working on third-world cities, proposed a breakdown into three or four types of conflicts, a typology that can be systematized in accordance with the United Nations' typology of sustainable development: economic conflicts, environmental conflicts, social conflicts and political conflicts. In the case of Buenos Aires, the

first conflict results from people asking for connection to the water supply without the means to pay the full cost: cross-subsidies are needed. The second conflict deals with both increasing water contamination and the rising level of the water table: as more people connect to water supply without having sewerage, the worse problems of contamination and excess groundwater become. The third conflict concerns the relationships between the city, the national government, international financing institutions and multinational companies that provide services.

For those who work primarily with large Indian cities, the issue is mostly one of scarcity. They proposed the following breakdown: lack of access to clean water sources for the poor, the quantity of water available for public services (reallocation issue of water rights), and quality issues that result from either overexploitation or industrial pollution (the decreasing quality of raw water implies growing treatment costs). They also viewed conflicts as ‘the activation of a credible threat’ at different levels, such as the media, public opinion, demonstrations, riots, etc. The case of Mexico illustrates this approach with a quantitative analysis of various forms of ‘water unrest’.

Colleagues working in a Mediterranean context are concerned, more than in the rest of Europe, by the environmental dimension of urban water issues. This is due to the ‘hydraulic mission’ tradition, which led governments to misallocate funds and to go on financing a large water-transfer infrastructure instead of tackling urban and industrial pollution and water demands. Luisa Schmidt envisions a more general conflict potentially involving the poorer fraction of the population in Portugal, which faces growing difficulties in accessing water, while wealthier people and tourists appropriate water resources and drinking water (e.g. with the increase in golf course development).

Karen Bakker, a specialist on the privatisation of the UK’s water services who now works on the history of water services development in Jakarta, also proposes a typology, but one with two axes: one that considers governance of the services, the other the technologies employed to that end.³ The first axis proposes a continuum from individual to community solutions to water provision, to corporate solutions involving public authorities and private capital. The second contrasts artisanal and low-cost solutions with expensive industrial ones – that can, however, offer economies of scale. Conflicts would then occur in situations of change along these two axes.

This typology is not incompatible with others, such as ‘access-quantity-quality’, but it was felt that it could be completed by adding a third axis, representing the relationship between the city and its environment, both social and natural (there are natural shortages and socially constructed ones). The larger the city in a given geographical context and the bigger the pressure on the environment, the farther away the city needs to go to obtain its water, or the more it needs to treat water. Similarly, with larger cities, waste-water requires technology to reduce the time and space needed to stabilize urban waste.

³ Bakker, K. 2004: *An Uncooperative Commodity: Privatizing Water in England and Wales*. Oxford University Press.

Now if we summarize Bakker's presentation, we get the following grid:

	Artisanal		
Individual & community	Private or public wells Water co-ops (neighbourhoods)	Water vendors Bottled water Private water for gated communities	Corporate & commercial
	Municipal treated water services under pressure, partly paid by local taxes	Supra-local water companies Multi-national corporations	
	Industrial		

Obviously, only urban areas in developed countries are in the bottom part of the table, while cities in developing countries can face issues of all four types. But one has to imagine a third dimension, representing the degree of pressure that the city exerts on its environment, or receives from it, be it for water supply, waste-water collection or storm water issues. In the above table, we cross the level of sanitary technology with the level of capital invested. But we must also take into account the additional dimensions of conflicts and solutions offered by environmental engineering, such as replacing sophisticated technology with land-use control or the reallocation of water resources.

By finding case studies that cover all four types of cities identified at the beginning of this paper, we can clearly illustrate a wide range of urban water conflicts. Although none of the following papers deal with situations in Africa or the United States, we believe we have gathered a relatively representative set of studies illustrating various sorts of water conflicts in various types of cities.

We do not pretend to hope we can offer UNESCO an ideal tool with which to solve all of the conflicts surrounding urban water services. Indeed, members of the group will continue to disagree on certain issues (for example, the role of the private sector is a topic of debate among the Scientific Committee for the European Declaration for a New Water Culture). But at least we can present the terms of these debates more clearly than has been done to date.

Above all, it is our hope that the inclusion of planners and social scientists working on urban water conflicts in the task force and in UNESCO-IHP networks will improve the focus of their output and result in a more useful guidelines document. This report, published as part of UNESCO-IHP's Technical Documents in Hydrology series, is a landmark in that direction.

As noted above, this collection begins with a paper on the history of urban water services in Europe and related conflicts. This is followed by a paper by Christelle Pezon on the

development of the French water services delegation model, partly done through an analysis of supreme administrative court cases.

The next section is devoted to Latin America, a region well known for water conflicts. Ana Britto and Ricardo Toledo Silva present a synthesis of urban water conflicts in Brazil, insisting on the intergovernmental nature of the major disputes. Sarah Botton and Gabriela Merlinsky go into more detail through the complex case of Buenos Aires and, lastly, José Esteban Castro covers unrest in Mexico City.

Next are two papers on water conflicts in Asia, linked in part to the region's very high population densities and rural migration to cities: Janakarajan, Maire Llorente and Marie-Hélène Zérah cover two cases in large metropolises in India (Delhi and Chennai), where water scarcity and a lack of access reinforce the ongoing unsatisfactory situation. Karen Bakker presents the case of Jakarta, where privatisation under a weak governance system has resulted in a violent situation.

Lastly, two papers illustrate various situations in Europe: Antonio Massarutto looks at the Italian case and Matthias Naumann and Markus Wissen discuss the water services crisis in East Germany that followed from unification.

As co-ordinator of the task force I wish to address many thanks to these partners, who agreed to prepare these reports for UNESCO under a limited time constraint, not forgetting Evan Vlachos for his initiative. I would also like to extend a warm welcome to potential contributors: we need to, and certainly can, develop a series of *Urban Water Conflicts* reports.

Urban water conflicts in recent European history: Changing interactions between technology, environment and society

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Introduction

Two hundred years ago, European city-dwellers obtained their water from public taps, public or private wells or water vendors. There were no public water-supply systems. The first concession contract for a piped water system connecting private houses, granted in 1781 in Paris to the Perier brothers, went bankrupt in a few years.¹ In the nineteenth century, however, the skill of British mechanics made it possible to offer pressured water service in urban areas, and later to extend this to rural areas. Other European countries soon followed Britain's example, and engineers and sanitation companies also invented various sewer systems to handle both waste and rainwater. In the first half of the twentieth century, chemical engineers invented technologies for treating drinking water as well as waste-water, which increased the autonomy of cities *vis-à-vis* their environment. Today, Europe is the only continent where the great majority of the population is connected to a public water supply (PWS). Most of the population is connected to centralized public sewage collection and treatment (PSCT), and those who are not are able, at least in low density areas, to rely on efficient decentralized on-site sanitation systems. In ecologically concerned countries, innovation in sewerage has enabled the development of environment-friendly storm-water control.

We argue in this paper that it is important to keep in mind these two centuries of experience, not only because of the period's overall success, but also as a history of many

¹ The Perier brothers attempted to use a steam engine to pump water from the river Seine into a reservoir and distribute pressurized water to private subscribers.

different conflicts. Generally speaking, this history remains at odds with the ongoing globalization debate over urban water management: the open conflict between the World Bank, economists and water companies, on the one hand, and the alter-globalization movement on the other is about the respective merits of public- and private-sector intervention in water services. This debate is particularly important in Europe in light of various proposals made by the European Commission (EC) to open up the provision of ‘services of general *economic* interest’ to the private sector, and thus to competition. Another issue is the potential impact on the budget of poorer households of ‘full cost pricing’ of water services, as advocated by the European Union’s (EU) Water Framework Directive (WFD).

The history of how relatively sustainable water services have developed in Europe suggests that the public vs. private debate is inseparable from the relative centralization or decentralization of the provision of water services. Although water supply services initially developed via concessions to private companies, most urban municipalities in Europe soon decided to take on the responsibility of extending the infrastructure to the entire population, and to operate and maintain it over the long term. This was often possible only with the financial assistance of higher levels of government. While today some European countries are questioning the degree of municipal involvement in water services and are reorganizing services at the supra-local level, the history of decentralized water services should also be considered in the non-European context. This allows us to better understand recent advances in environmental engineering that are challenging the long-standing autonomy of the water services sector.

We explore three dimensions of sustainability (economic, environmental and ethical) and the conflicts relating to them that have arisen over the years, as well as the power conflicts that can arise between different levels of government. To do this, we follow the historical development of water supply and wastewater control technologies as well as changes that have taken place in technological paradigms and engineering disciplines, because these changes have occurred in relation to various kinds of conflicts.

If we go back to the beginning of public water services, we can broadly sketch their development in terms of three stages. In the nineteenth century, before the discoveries of Florence Nightingale (1820-1910), Edwin Chadwick (1800-1890), Robert Koch (1843-1910) and Louis Pasteur (1822-1895) were popularized, PWS were developed from a belief that water should be drawn from natural environments far from urban developments. Large cities in particular had to go further and further to obtain their water supply. By the end of the nineteenth century, however, this initial strategy had begun to meet with resistance, due to competition with other cities or local needs. But the discovery of bacteriology resulted in the invention of water treatment, which allowed local authorities to provide sanitary water by drawing from much closer sources, including the rivers on which the cities were located. Municipalities then took the lead, and in many cases terminated contracts with private companies that had been unable to supply water to the whole population.

Once water services became a mature industry, municipalities also had to face issues of long-term system maintenance and capital reproduction. Some were led to reintroduce or to develop industrial and commercial services or to delegate services to private companies, sometimes companies they created and owned themselves. By the end of the

twentieth century the issue of cost recovery had led many to question the technological choices of the chemical engineering period, and to attempt to solve the sustainability issue using new strategies inspired by environmental and ecological engineering.

Governments intervene to provide long-distance clean water supply

When industrialization began in Europe, prevailing legal systems were still largely inherited from the feudal period, which meant that water rights usually differed between landlords and peasants. Communities had the right to use water for domestic and husbandry purposes, and landlords had the right to use and misuse water, provided that they respected the inalienable rights of communities. In expanding cities, migrants from the countryside imported their customs and requested free water of good quality from public taps. These growing needs could only be met through some sort of water transfer from a distant and 'pure' natural environment, which implied landlords' consent. Later, with the formation of nation-states, national governmental intervention developed.

Water services were initially supplied by private companies, which tried to recover initial investments from bills paid by their customers. On the one hand, these were often industrial and not financial companies: their aim was to install infrastructure and get repaid for it, not to operate the services over the long term. Indeed, they were often tempted to sell the initial network to local investors so as to recommence in another city. But overall, few people in the nineteenth century were ready or able to pay water bills. This created growing conflicts between companies, users and municipalities: for lack of proper payment for their services, companies often postponed investments in extending or maintaining service, which in turn attracted critiques, and even legal prosecution, from municipalities. Increasingly, the latter were tempted to terminate concession contracts and recover the services and run them under direct labour. In some cases, national governments sided with the private companies, and maintained their operations. This was the case in Lisbon, where the central government distrusted the municipality's capacity to operate the service. But in most cases, governments allowed municipalization and even supported it financially. To understand this, one has to recall that most initial private ventures throughout Europe were from English or French companies, and were all the more criticized because they were foreign. A clear example of this is the Italian law of 1903, which imposed municipal management for basic services such as water, gas and public transportation. The same happened in Berlin. But even in Britain, takeovers by local authorities occurred, and it was both systematic and premature; it was eventually called 'water and gas socialism', which indicates a certain amount of conflict (Saunders, 1983). Indeed we should talk about 'social municipalism'. Interestingly enough, in the Nordic countries, such discussion was hardly noticed. In any case, municipalities managed to develop the services and to make them, at least temporarily, trustworthy, expanding and self-financing.

This public funding was made possible by the use of finance sources such as early savings banks controlled by local governments. Their bonds were also found attractive by the public. In Finland and New England (Anderson, 1988), fire insurance companies

also contributed significantly to the development of water services, because the generalization of standpipes were effective for fighting fires.²

Consumption-based bills by private companies were partly or totally replaced by the payment of rates based on property values or by local taxes paid by all citizens, which would provide revenues independent of actual water consumption. Today, the payment of water supply through rates is still largely dominant in Britain, and in many countries, sewerage has long been paid through local taxes, particularly since the systems have been combined.³ In addition to this, governments often subsidized projects for national health policy reasons. Public procurement was then bound to succeed more than private, as in the example of Glasgow:

direct municipal provision seemed to offer several advantages to the city. The existing private company had ... outdated infrastructure [and] consequently was unable to cope with the demands of the rapidly growing population... Moreover, the company was not in a position to raise the necessary capital for improvements, unlike the Town Council, whose extensive community assets made it eminently creditworthy. Public accountability meant that unpredictable market forces could be over-ridden, and a stable service provided... Loch Katrine was located in the Perthshire highlands, some 55 km from Glasgow, and thus well away from the polluted city... The official opening by Queen Victoria on an appropriately wet autumn day in 1859 was an event of enormous significance for Glasgow... Loch Katrine was unquestionably the prime municipal showpiece for the city, combining the wonders of Victorian technology with the nurturing quality of pure Highland water (Maver, 2000).

Joel Tarr (1996) has illustrated this broad approach in the United States (US): getting cleaner water from farther away, on the one hand, and using the rivers as sewers on the other – the latter decision relying on the assumption of natural dilution and riverine self-purification.

To ensure the whole population was connected to the PWS, many cities not only had to take over the utilities created by private companies, but also to force the population to connect. In Paris for instance, part of the population preferred the taste of river water sold by vendors, and other people trusted only their own wells, even though urban densification increased the risks of surface and groundwater contamination. Private companies also sold water that was partly pumped from the river. It was Baron Georges-Eugène Haussmann and his engineer Eugène Belgrand who decided to make water

² This issue became increasingly topical immediately after the Great Fire of Turku in 1827. The General Fire Assistance Company of the Grand Duchy of Finland was established in 1832, and funded cities establishing water works. The advantageous loans offered by this insurance company played a large role in the expansion of city water works. But there were other important forms of funding too, especially the taxes paid by distilleries. In each locality, one company was given the exclusive right to distil spirits against the payment of a liquor tax. From this tax, little-by-little, capital was raised for the establishment of a water works: about 10 per cent of the total required – most came through taxes and substantial donations. Loans were also given by local banks where necessary. A loan from the fire insurance company was nevertheless generally the largest single source of funding, and the interest charged was clearly lower than that offered by other creditors (Juuti and Katko, 2005).

³ Today, of course, a growing number of countries, such as Finland, France, Germany and Sweden, have legalized the inclusion of waste water charges in water bills, or have created direct charges.

supply a municipal monopoly, with water coming from distant sources. But he allowed the water company, *Compagnie Générale des Eaux*, to manage the billing for in-house connections. Most of the population still rejected billing, especially as the same systems provided clean water for free at public taps. Connecting every family to the PWS could be hastened only if one changed the financing system completely. Indeed, creating a local tax or rates based on property values provided the money as well as cross subsidies from the richer to the poorer. The Montreal case (Fougères, 2002) illustrates this trend: a PWS had been started by a private company as early as 1798, but it did not work well. It was transformed into a public direct labour service in two steps: first, as soon as it was incorporated, the municipality obtained authorization from the British Crown to purchase the private company, which was losing money and was willing to sell, but the city soon realized that it had similar difficulties in raising the funds necessary for connecting the periphery. In 1853, it obtained a new authorization from the Crown to compel all the inhabitants of Montreal to connect to the PWS and finance the service through local taxes. After fifteen years, the entire city was connected to the system.

The practice of delivering untreated water from distant sources remained dominant in the Americas and was later extended to the rest of the world after the Second World War, due to the combination of international financing institutions offering cheap money and various (Keynesian or socialist) forms of support for government intervention in infrastructure provision. In the 1950s and 1960s, large water projects were increasingly devoted, not only to cities, but increasingly to irrigated agriculture for the export market. Today still, many states in developing countries base their water policy on large water transfers, so as to indirectly subsidize the production of irrigated cash crops for the world market. In some cases, the maximum extractable water resources have been reached, and sometimes irrigation is *de facto* privileged at the expense of public water supply.

In short, government intervention initially allowed the transfer of enough water from distant sources through largely subsidized aqueducts. Local authorities soon started taking over the infrastructure, which had been initially created by private companies. The frequent financing of connections by local taxes or rates reduced the tension between urban populations and water suppliers, making public services acceptable. Consequently, municipalities were dependent on higher levels of government and distant water sources, the latter of which would eventually become unsustainable. The innovation of water treatment helped alleviate this situation.

From quantity at a distance to quality close at hand

In the heart of industrial Europe in the early twentieth century, growing population densities and reduced natural resources increased competition for pure water resources, while the development of bio-chemical analyses showed the growing extent of contamination. The issue was less quantity than quality. At the end of the nineteenth century it had been decided that, whatever source it came from, surface water should be filtered, and later, around the First World War, that it should be chlorinated, ozonized or disinfected through granulated activated carbon (GAC) beds. Groundwater, which generally provided much less water than surface water intake, was still not filtered, if treated at all.

Once water began to be treated on a regular basis, the question arose of why it was necessary to collect it from so far away. Taking it from rivers just upstream of cities would no longer make a difference in terms of public health, but would be more cost-effective. In that still early period, large European cities changed their strategy from investments aimed at increasing available quantities of water to those aimed at improving its quality. This, of course, resulted in a significant increase in operational costs. At the same time, the rise of the middle class meant that the domestic delivery of pressurized water went from being a luxury to being a normal commodity, and made it possible for customers to pay water bills to cover the costs.

This is exactly what happened in Paris a century ago. The idea that Paris should get its water from distant sources had prevailed since the third Empire (1850-1870). Indeed, the above-mentioned work by Belgrand was aimed at utilizing sources of water that were further from the city (about 100 km from Paris). It was even expected that Paris would eventually have to obtain water from the Loire, which would require central government licensing. However, the Loire has very low flows in summer, when the demand for water is at its highest, and the potential donor region around Orleans was strongly opposed to the idea.

In 1890, an engineer named Duvillard presented a project to draw water from Lake Geneva, situated 440 km away from Paris. Despite the project's impressive scale and scope, it was technically quite simple, even at that time. Proponents of the project soon came up with all sorts of arguments to convince the Paris city council and the French government that a 'capital of the world' would need at least 1,000 litres of water per capita per day – i.e. five times more than the highest standards of the time. This would allow Paris to have more luxurious fountains, improved street cleaning, greater domestic comfort and improved sanitation.⁴ It was also argued that such a quantity of water would extend navigation possibilities in drought periods, help flush waste-water from the new sewer system through the Seine and then to the sea, and leave other water resources for local economic development. In the end, they argued, a huge transfer would make Paris' PWS reliable forever, and the bigger its scale, the cheaper each cubic meter of water would be!⁵

But while proponents were finalizing studies for the project, an epidemic disease broke out and it was found that one of the distant natural intake points (the Loing springs) was

⁴ Paris is one of the few cities in the world whose streets are washed clean daily: for political and business reasons linked with Haussmann's decision to merge suburban communes and extend Paris from 12 to 20 arrondissements (boroughs), it was decided that water for public purposes would be produced by the city and delivered to the people for free through a public network, while a second network would serve domestic and other private needs to be paid for by water bills. Paris still has two PWS systems, one potable and the other non-potable by today's standards. The non-potable network uses hardly filtered Seine water to flush the sewers, supply the lakes in the Boulogne and Vincennes parks, and clean the streets. Other public uses such as fire hydrants have been discontinued, due to unreliability, low pressure, sprinkler clogging, etc.

⁵ It is interesting that a similar argument has recently been raised by the French-Spanish partnership to transfer water from the Rhone to Barcelona – a distance of 350 km. This example also shows the indirect impact of irrigation: Mediterranean cities have to get water from ever farther away, because the local surface and groundwater is provided to farmers almost free of charge through government projects.

to blame: this showed that even distant, ‘pure’ water could be contaminated and should be filtered and treated. In 1902, Paul Brousse, one of the founding fathers of French ‘municipal socialism’ (equivalent to what was derided in England as ‘water-and-gas socialism’), inaugurated the new water filtration plant in Ivry, just upstream from Paris. (It was recently redesigned to serve as a showcase for French water technology know-how.) A choice was made in favour of water treatment that would have a lasting impact, with chlorination later chosen after the First World War. Water demands were growing incrementally at the time, and the big jump then seemed too risky. Lastly, the Lake Geneva aqueduct project was discarded by Paris City Council for national defence reasons: what would happen if the Germans decided to attack the aqueduct and cut it off? In the end, investments that focused on water quality replaced those that focused merely on its quantity, just as chemical engineering supplemented civil engineering.

After the Second World War, the Prefect of the Seine *Département* (county) took advantage of a severe flood to obtain permission to construct three large upstream reservoirs on the Seine, Marne and Aube rivers, which were used to increase summer flows and meet Paris’s water demands even in serious droughts, as in 1976. Interestingly enough, a fourth upstream reservoir was planned by Mayor Jacques Chirac’s councillors in the 1990s, but it was abandoned for the same reasons that the Lake Geneva project was rejected (the water must and can be purified anyway, argued the water supply companies), and also because water demand in Paris dropped by 13 per cent between 1990 and 1996 (Cambon-Grau, 2000). In the end, Paris’s PWS used civil and sanitary (chemical) engineering technologies together to reduce their risks.

As in Paris, the invention of water treatment (chlorination developed during the First World War) allowed many cities to turn to nearby surface water and thus complete their water networks and serve the population through a primarily local solution. This is one common rationale for the generalization of municipal control of utilities, at least in temperate climates. The next-best solution would be to establish an inter-municipal joint board. Treating the water also meant increased operational costs, supporting the notion of water as a commodity to be paid by water bills, which would enhance the financial autonomy of the utilities. This commodification was better accepted in the twentieth century, when urbanites became accustomed to having tap water. After the Second World War, the rise of pollution in rivers was increasingly unacceptable, and cities were constrained to build sewage treatment plants in order to reduce discharge. In many European countries – but not all – this had to be done with reduced government subsidies, and authorities again found the solution was to finance operational costs through water bills. For example, the costs of wastewater treatment in Finland were covered essentially by greatly increased prices. In France, the development of sewage works was made possible through taxes on drinking water, which went into a sort of mutual banking system, the *Agences de l’eau*.

In a way, the two types of plants created the frontiers of the ‘networked city’ (Tarr and Dupuy, 1988) and allowed for the development of an institutional, legal and economic system quite separate from the issue of water resources allocation, and one that would eventually be extended to rural areas. This was the domain of local public services. Conversely, central governments in the Mediterranean region of Europe remained actively involved in water services, sponsoring the development of regional bulk water transfer institutions. Local authorities were provided with very cheap water to distribute

to their population, which in turn helped maintain the tradition of inexpensive but relatively unreliable and incomplete services. Today, paradoxically, there is less open criticism of service quality in these countries than elsewhere in Europe (for example, in the UK and France), but water users express a sort of ‘silent distrust’. Raising water prices or rates in these areas is very difficult, because authorities first need to earn the confidence of their citizens by improving the service.

Despite these differences, water and waste-water services eventually became a mature industry in Europe. However, the initial infrastructure, which had frequently been subsidized, eventually needed replacement, and environmental performance had to improve. This created a new set of conflicts.

The crisis of municipal water supply services

France, Germany, the Netherlands and Nordic countries all made efforts in the field of city sewage collection from the 1950s, and in sewage treatment from the 1970s. To make funding easier, it was decided to change the status of the PSCT from an imposed administrative service, for public health reasons, to a commercial service similar to the PWS, and then to have it financed by water bills. This caused a steady increase or even a drastic jump in consumer bills, depending on the degree of government subsidy the PSCT still received.

But in the same period, the PWS itself became a fully-fledged business, which meant that it had to face the issue of renewing an aging infrastructure without the financial help of government subsidies. This is the fundamental reason that municipalism had to evolve in various ways towards a legal private status: under traditional public accounting, it was neither allowed to depreciate its assets nor to make provisions for renewal, while private accounting could. The PWS, and later the PSCT, slowly turned towards commercial status, i.e. depreciation and provision practices, and this, of course, meant another rise in water bills. Governments today are influenced by economists who support full, or at least fair, cost pricing, phasing subsidies out.⁶ In turn, water bills have risen dramatically: in France, bills nearly doubled on average between 1990 and 2000. This has brought unexpected consequences: an increasing number of large-volume users (such as the manufacturing and service industries) have either changed their processes or invested in leakage control. This explains to a great extent the recent plateau in the volume of water sold. In some countries, even domestic users have reduced their demand for PWS, through changes in fixtures and domestic equipment, different garden designs, and using rainfall storage or other alternative sources of water for non-drinking uses. Such cases have been identified in several places in France, Belgium and Germany (Montginoul, 2005; Cornut, 2000). More recently, this has happened in Central and Eastern Europe (Juuti and Katko, 2005). Eventually, these new attitudes will threaten the financial balance of public services.

At the same time, water suppliers have realized that it is going to be ever more difficult to comply with drinking water standards at reasonable costs. The control extended to

⁶ Fair cost pricing means that the principle of cost recovery is accepted but only partly implemented, i.e. bills include part of the capital depreciation cost.

eco-toxicologists over standard production has tended to privilege a traditional 'no-risk' strategy (Lave, 1981) without taking the increased costs into account. For example, in Europe, the lowering of the lead content from 50 to 10 micrograms per litre ($\mu\text{g}/\text{l}$) implies replacing all lead pipes, which will cost up to US \$35 billion, while there is no evidence that the former standard resulted in lead poisoning from water.⁷

The multiplication of strict criteria for drinking water is progressively making the situation over-complex. Chlorination by-products incur a very small probability of cancer, and there are many other examples of similar substances that are nonetheless strictly controlled through modern drinking water standards.⁸ Year after year, the media report a growing proportion of people receiving water that does not comply with current standards, even though water treatment processes are continually improving (Okun, 1996). This is creating growing distrust on the part of water users, and in some cases has led to open conflict.

To lower the risk of being unable to meet current standards, water suppliers, along with local, national and European authorities, have turned to a new strategy: land-use control in areas or catchments where groundwater is used by the PWS. This often requires changing to organic, or at least nitrate- and pesticide-free, agricultural practices, along with compensation programmes for farmers (Brouwer et al., 2003). This policy turns out to be cheaper than water treatment, while also being advantageous for farmers. Yet we seem to be a long way from a new and more sustainable equilibrium. In the meantime, drinking water criteria are regularly reinforced, as new risks are discovered, while treatment costs and their negative effects continue.

In any case, in contrast with what some water engineers in Spain seem to think (Llamas, 2001), large-scale, long-distance water transfers are not appropriate for today's water needs (Barraqué, 2000). The situation that began in California in the 1970s has now spread to Europe: it is becoming ever more difficult to build dams because environmental movements that oppose their ecological impacts have been joined by economists and neoliberals who advocate full-cost payment for water infrastructures by their beneficiaries. The new rationale seems to be, 'save first and manage the demand, there is no cheap money in sight for water transfers'. Copenhagen is not going to buy water from Sweden, Bari isn't going to have Albanian water, London will have to reduce leakage drastically before it can obtain water from Scotland. In 1980, a water-transfer scheme to transport water from Umeå, Sweden to Vaasa, Finland through a submerged pipeline on the sea bottom was proposed, but finally rejected. Many other fancy projects on other continents are dying like so many 'hydro-dinosaurs'.

However, water transfers or treatment technologies are still needed, depending on the economic situation. For instance, long-distance rock tunnels for raw water transfer were completed in 1982 for the Helsinki metropolitan area in Finland (Katko 1997), and for the southern region of Sweden in 1985 (Isgård, 1998). In Mediterranean countries, there

⁷ This measure concerns only certain European countries: France, Italy, Spain and the UK. Other countries, Nordic ones in particular, had few lead pipes to begin with and have already phased them out.

⁸ Bacteriological criteria are now just a small part of drinking water standards; heavy metals and micro-organic compounds bring the total to 63 criteria in Europe and 84 in the United States.

is now a rise in desalination processes to produce additional water for tourists in the summer.

New York City, like many US and Canadian cities, could follow a different path than European cities have, because of its abundance of clean water. Using a lot of water and taking it from farther and farther away, while protecting the water intake points through extensive land-use control, has become more widespread. However, New York might still have to take European history into consideration, because clean natural resources are not immune from cryptosporidium, a type of protozoa, and other new (and lethal) substances. An Environmental Protection Agency (EPA) panel of experts concluded that New York should not be given any further derogation on the need to filter and treat water extensively, while city engineers argued that increased land-use control would suffice (Okun et al., 1997; Ashendorff et al., 1997). The controversy is serious, as the requested new treatments are likely to substantially increase water prices, which might lead to serious social impacts and a possible water demand collapse.⁹ And in that case, one might ask, why not just pump the water in the Hudson River rather than get it from Canada? It seems, however, that this issue could be so controversial that such a big change will be suspended.

To summarize this section, we could say that in Europe, due to population density and environmental issues, the water industry has had to progressively supplement the quantity approach (hydraulics and civil engineering) with a quality approach (water treatment and sanitary engineering), and more recently with resources protection and demand management (environmental engineering). But this in turn questions the viability of pure municipal procurement and calls for various types of cost averaging.

European water services and the three Es of sustainability

Can Europeans afford their water policies? This has been a growing issue since the 1990s, with the first estimations of the cumulated investments required by the anti-eutrophication directives adopted in 1991 (targeting urban waste-water and nitrates from agriculture) in addition to previous directives. Water policy has been increasingly criticized by the public, the press and politicians. Paradoxically, criticism has been much stronger in northern Europe, where the infrastructure is completed, than in Southern Europe, where infrastructure construction is still under way and water prices are still far from matching costs, leading to government subsidies or infrastructure degradation. This shows that *rationalization* (both economic and environmental) cannot really start until *rationing* is over.

The issue has developed between the European Commission and some of its Member States. It was felt that supplementing traditional standards based on emissions control (e.g. pollution discharges and drinking-water criteria) with another type of regulation, based on the desired ecological quality of the aquatic environment, would be too costly, and that, furthermore, it would be impossible to meet all of these regulations at the same time, – which meant that governments could be sued any time by their own citizens for

⁹ In particular, if metering is introduced to replace the outdated frontage rates system, negative redistributive effects could be serious, as pointed out by Netzer et al., 2001.

non-compliance with the legislation. This resulted in halting the issuance of a projected directive on ecological river quality until a framework directive was set up and discussed, to introduce coherence and financial savings. The European Framework Directive was issued in October 2000. Some have questioned whether the target fixed by the European Commission, Parliament and Council of ‘cleaning all water in fifteen years’ is realistic. Moreover, the European Commission and Council both officially support full-cost pricing, without having carried out any feasibility studies.

However, the issue of cost may have been biased: the costs of implementing regulations have generally been calculated on the basis of technologies that are well mastered, but which were developed by sanitary engineers before the rise of environmental issues, and under a different rationale *vis-à-vis* risks and costs. The high costs incurred today might, then, be due to an incapacity to develop environmentally innovative technologies and, above all, strategies other than supply-side or ‘end-of-pipe’ solutions, such as demand-side management, land-use control and integrated planning (Moss, 2000). Moreover, Southern European countries, with a different climate and different population patterns, may need to develop specific technologies, rather than copying northern states, even though they receive support from the latter via European structural funds. However, it will obviously be difficult to convince some Southern European countries to pass this new technological reverse salient before a severe crisis occurs. These issues were addressed in a comparative study of the forecast costs of complying with the most costly directive, on urban wastewater collection and treatment (UWWD), issued in 1991.¹⁰ The Eurowater partnership of European water policy analysts has addressed the issue of future water services (i.e. PWS and PSCT) in light of the UN’s definition of sustainability: how does one reconcile economic, environmental and ethical/equity sustainability criteria? This is what we call the ‘three Es approach’:

- Economically: how is the enormous capital accumulated in water services technologies to be maintained and reproduced in the long term? If we do invest enough, what impact will this have on water bills?
- Environmentally: what extra investments are needed for the sake of public health and the environment, and when cumulated costs are too high, are there alternatives to the common systems?
- Ethics and equity: if all sustainability costs (long-term reproduction of the infrastructure, environmental protection and user costs) are to be passed on to users, can they afford it, and is it politically acceptable?

The two first issues are interrelated, through the limited capacity of governments and cities to face unsubsidized investment. Investments in new environmental measures and the replacement of ageing infrastructure do overlap, but both have to be made without

¹⁰ Eurowater is a partnership study funded by DG XII, LAWA in Germany, the NRA in Britain and the Gulbenkian foundation in Lisbon. The research partners were Tom Zabel and Yvonne Rees of the WRc in England, Jan Wessel and Erik Mostert from the River Basin Administration centre in Delft T.U. (Netherlands), R. Andreas Kraemer and his colleagues at Ecologic, an environmental policy consultancy in Berlin, and Bernard Barraqué’s team at LATTS, a social sciences laboratory within the Ecole Nationale des Ponts et Chaussées – under the leadership of Francisco Nunes Correia, a hydrology and environmental policy professor at Lisbon’s civil engineering faculty.

subsidies. If England and Wales were to rebuild their water services infrastructure completely, they would have to spend £189 billion! Some of these assets depreciate after a hundred years, but others depreciate after only thirty or even ten years. With the present centralized regulation system, OFWAT, the UK water regulator, can calculate what investments should be made and when, and which price should result. Other countries are trying to do this as well, despite the decentralized organization and small size of the structures. But many experts believe that we are quietly exhausting initial capital, particularly for sewers. In any case, water prices are reasonable in the UK when compared to other European countries.

In 1989, to make privatization more attractive, the British government cancelled the previous regional water authorities' debt, and on top of that offered a 'green dowry' to help new companies face the 'nasty European Directives'. Altogether, what anybody other than Thatcherites would call subsidies amounted to £6.4 billion, i.e. more than the French or German governments have given to their water services in the last twenty years! In her thesis, Bakker (2003) shows that British privatization put the water industry into a fundamentally unsustainable situation, which was to become increasingly obvious more than twenty years later. This is why the issue of cost recovery, which was raised by the Water Framework Directive, is so unclear: if one wants to take economic sustainability seriously, it is necessary to look back thirty or fifty years to see how subsidies made then have influenced today's prices. If subsidies are removed now, effects on water prices will not be felt for at least another twenty years.

We also found that water suppliers or authorities, under various modes depending on their political and historical culture, have organized cost averaging or cross-subsidy mechanisms to limit the impact of heavy but long-lasting investments on water prices. Some do it through spatial integration, with a concentration process occurring across Europe that tends to expropriate local authorities of their former responsibilities over water services: Italy now bans direct local labour procurement and is moving towards the integration of *servizio idrico integrato* at the province level, although this has met some resistance from local authorities.¹¹ Conversely, in the Netherlands a significant and voluntary concentration of water services has taken place since among local authorities the Second World War, and commercial forms of water services provision have been adopted: today there remain only fourteen mixed economy PWS companies and around twice that number of water boards in charge of PSCT.

Another strategy is cost averaging across time (earmarked funds, water banks such as the French *Agences de l'Eau*, modernization of public accounting to allow for depreciation, etc.). The Germans do this through an original institution, the *Stadtwerk*, a technically private but publicly owned company that runs several technical networks in a given city: this model was criticized by the World Bank, but on the basis of incorrect data (Barraqué, 1998). The *Stadtwerk* often supplies electricity, transportation, water and gas services, while sewerage is taken care of by another municipal organisation (Juuti and Katko, 2005).

¹¹ This is what happened in Britain: before centralization created ten regional authorities in 1974, which were privatised in 1989, a sustained concentration process had been underway since the Second World War

Lastly, social forms of averaging are well known, even if they are not always presented as such: for instance, paying for waste-water via local taxes makes this service more expensive for those who have a large house, and who are usually wealthier. Under municipalism, water suppliers did not pay much attention to the detailed breakdown of potable water uses and distributive effects of tariffs because they wanted the best quality in unlimited quantities to serve all purposes (in a *commonwealth* vision). Modern water suppliers are still reluctant to really study distributive effects: they want water services to be commodified (through billing instead of taxing) for financial reasons, so they assert that it is more equitable that way. However, the English and French examples show that commodification is dangerous, even for water companies themselves, because users will not readily accept that a good service is costly; and they will likely have a hard time accepting the fact that if they save water, their unit price (per cubic meter) will probably go up! So the opening of the traditionally closed PWS policy community to a whole range of newcomers, in particular the public, makes water engineers feel awkward and insecure. But is there any alternative to this opening if what is at stake is the public's general confidence in the service and those who provide it?

The new social issue of sustainability

It is therefore the third issue, the third E of Eurowater's sustainability, the ethics/equity dimension, that is the most crucial today: Are social and political acceptability still possible in the long term, or are we moving towards a collapse of the networked model for water? There was general satisfaction with water services until they had to deal with demand management and pricing closer to real costs. But this was based on what Martin Melosi calls 'out of sight, out of mind'. Today, the limitations of the supply-side model are forcing managers to study user demand as any business does: through marketing. The breakdown of drinking-water demand and the evolution of sector-differentiated uses have to be studied. But this may not be sufficient, and utilities may well have to involve the public in their studies. For instance, claiming that metering is more equitable and efficient (because water conservation is rewarded) may become problematic for residents of central cities who live in condominiums, because water use is largely determined by the use of appliances, and there is little elasticity in (existing) prices (Chesnutt and Mitchell, 2000).

Yet even though local econometric studies show little elasticity in domestic prices, per capita use is slowly reducing in the developed world. In the US, this may be attributed to information policies and subsidies for individual conservation measures (Dickinson, 2000). The point is for changes to occur slowly, so as to let people adapt to higher water prices over sufficient time. In northern Europe, less consumption and higher prices limit the potential scope of change when compared to North America. However, there has been such a reduction in water consumption (mostly from large-quantity users and outdoor uses) that the only way to maintain the cost recovery principle is to raise unit prices. The limited amount of information given to users, in particular on the difference between short-term and long-term sustainability, and on the real reasons for (formal) privatization, has contributed to a growing distrust of systems that had reached their equilibrium under a municipalist type of welfare system. In some cities in France, this distrust is growing to the level of court action.

Southern Europe illustrates this point differently, as the incomplete infrastructure has prevented utilities from increasing prices to cost-recovery levels, which has led to irrational allocation. Almeria, for example, was supposed to obtain its water from the Pyrenees or the Rhone, at a cost ten times as much as the city would pay to buy water from farmers. Through a model initially developed under the Franco dictatorship, but now involving European subsidies, Spanish farmers overexploit the aquifers and request increasing volumes of surface water transfers to grow tomatoes and strawberries, part of which are bought as surplus by the EU. Farms are commonly owned by large northern agribusiness. If they were not constrained by this uneconomical set up, farmers would make more money without working, just reselling 'their' water. This happened in California, and the only problem there was that, to be accepted, evidence had to be shown that there was a 'water market'.

In fact, what we have to face is that the growing commodification of water services is very dangerous if it is not done within a collective re-learning process, as opposed to an 'out of sight, out of mind' mentality. For instance, there is a trend in Europe towards individual water metering and billing for the sake of better equity, even in apartments in small buildings, so that people are better able to trade off between saving and paying. Yet in most experiments, individual metering does not induce a significant change in consumption patterns, in particular after a few months, and in many cases the savings of the most thrifty are offset by the yearly cost of the meter itself (depreciation, reading and billing separately). Consumers are often angry to see their water bills increase after they had been told that they would save money. And this distrust, too, is growing. According to Rajala and Katko (2004), installing meters in individual apartments might be feasible in new houses, but it is too expensive in older buildings.

One of the most interesting recent cases is the decision by the Government of Flanders, Belgium to strictly implement Agenda 21, and to provide users with an initial volume of water for free. For practical reasons, the free volume was set at 15 cubic meters per capita per year, with extra water charged at rates that ensured water supplies would make the same income as they did previously. The consequences have been studied by the social and economic council of the Region of Flanders (Van Humbeeck, 1998). First, water suppliers have seen their total volumes shrink, because increasing block tariffs have increased prices. It appears that people have invested in cisterns and in private wells to water their gardens, etc., and suppliers have been obliged to raise unit prices. Second, it turns out that wealthier families are paying a little less than before, while poorer ones are paying a little more. This is due to specific socio-demographic conditions: wealthier families are larger than poorer ones, yet extra children do not use enough water to result in higher bills (the free initial volume being per person). This complex case illustrates how little we know about domestic water use. If we are going to successfully tackle the present water services crisis, we will need more than just the economist's toolbox and good intentions. We need anthropologists, sociologists, historians and geographers, etc., all working together towards developing an interdisciplinary approach. Attitudes are so variable and culture-specific that it might be very difficult to show any rationality behind apparent price elasticity.

Conclusion

With increasing discussion on how to reach a better compromise between the economic, environmental and ethical dimensions of water services sustainability in the EU and in the US, the development of new tools and indicators can give us some confidence for the future. But what is missing is an indicator translating the general public's overall degree of confidence in water systems and in the water services policy community.

The real threat to water services is illustrated by the situation in Eastern Europe and in large cities in developing countries: when utilities are not fully reliable, in terms of quantity, continuity and quality (particularly sanitary quality), the compensation strategies adopted by various groups of users tend to *increase* uncertainty and the unreliability of the services. In this case, trying to apply new economic approaches that are suited to the mature systems of developed countries might be unwise, if not catastrophic. Indeed, privatization and even public-private partnerships at state or regional levels show their limitations when it comes to universalizing water services. Maybe, in fact, it is impossible to improve deficient utilities in developing countries – maybe these deficiencies will persist, together with increased use of bottled water. Zérah (1997) presents a striking case in New Delhi, for example. When we look closely at the situation, we find no significant differences between this and the kind of poor services and private alternatives seen on Greek islands.¹² If confidence in the PWS in developed countries continues to shrink, and water volumes sold decrease significantly, they may see a growing irregularity of service, so much perhaps that the systems found in large third-world cities would finally prevail in the long term (Barraqué, 2001).

In Durban, South Africa, the French water supplier, Lyonnaise des Eaux, has been quite successful in introducing special chip cards that are used to buy potable water from public taps: the company makes some money and users have no more gastro-enteritis and escape the traditional tribal control of the wells. In Buenos Aires, the same company proposed providing cheap bulk water at the entrance of *barrios*, instead of desperately trying to meter each user and fight for bill recovery. But both examples raise contentious issues: are poorer populations in developing countries bound to stay on these alternative partial services for ever? We could argue that the reason they have these alternative types of PWS is that there is no municipality with sufficient legitimacy and capacity to build reciprocal confidence between the company and water users.

So why not we take a second look at the future of municipalism? In our view, the only way to escape the dilemma faced by companies such as *Lyonnaise des Eaux* is municipal implication, as was common before local welfare and public economy were thrown into the dustbin of liberal economics. What municipalism achieved was to channel the savings of the upper and middle classes into the financing of a long-term solidarity-based system for all through a public economy of urban services, sometimes with the participation of the private sector, but without privatizing the actual infrastructure. Moreover, municipality-owned water undertakings can be made autonomous, thus covering their

¹² In some Greek islands, people rely first on their wells and cisterns, turning to PWS only for additional uses. This makes the demand for public water highly variable, which has a negative impact on the reliability of the service.

costs. In many countries, such undertakings buy goods, services and works from the private sector based on continuous competition – without becoming locked into long-term operational contracts (Hukka and Katko, 2004). In most countries, such arrangements have been carried out since the beginning of the modern systems in the late 1800s (Juuti and Katko, 2005).

Indeed, the territorial dimension of the issue is more important than the simple public vs. private debate. To maintain hope for cities in developing countries, we will have to invent similar mechanisms at appropriate territorial levels, depending on the national/local citizenship traditions and community cultures. Such a subsidiary system would certainly offer better guarantees for national and international public investors, which in turn would result in access to cheaper sources of funds for water systems. This seems to be the lesson that the historical development of European water services has to teach us.

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The French PPP model for water services management: Genesis and key factors of success

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Introduction

The Public Private Partnership (PPP) is a consensual concept that emerged during the 1980s in relation to the evolution of the role of public institutions in economics. However, PPPs are not clearly defined by law. To some extent, they include any type of informal partnership between private and public institutions. In a more narrow sense, they imply a formalization of relationships through a contract, or the creation of a public-private company. This is why PPPs can only be defined in terms of practical experiences.

In this paper, we focus on the PPP model for water services management, which was developed in France in the middle of the nineteenth century and was strongly promoted at an international level during the 1990s, especially in developing countries. The same type of contract, the concession, was used in both cases, but in two very different contexts. In the nineteenth century, local French authorities built partnerships with private companies in order to develop collective and residential water distribution systems. In the 1990s, a number of large cities in Argentina, Bolivia and Brazil signed contracts with international companies to extend residential water systems into poor neighbourhoods. However, in spite of improvements in connection rates, concession contracts have failed to generalize access to drinking water. Those PPPs are being strongly challenged today, if not contested or even terminated. This raises questions regarding the underestimation of the specific risks associated with developing countries or the capacity of foreign models to be implemented in different contexts (Breuil, 2005).

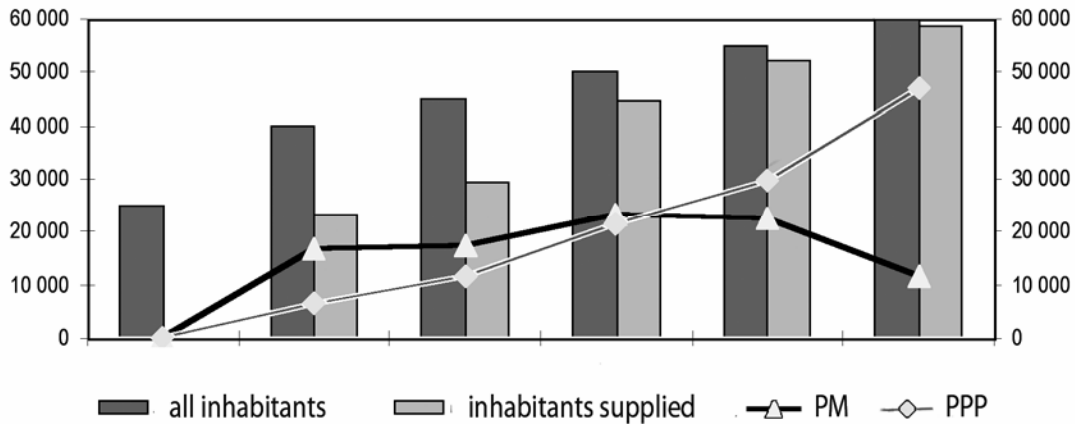
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We demonstrate that there was no reason to expect that the concession contract would succeed in generalizing access to water, given that it has to date failed to do so anywhere, anytime, even in France (Pezon, 2000). We also characterize the conditions that led the French PPP model for water services management to become the main way of providing drinking water in France (Pezon, 2005). One has to be very careful and particularly precise about which model is referred to: success credited to a particular model could, in fact, be misplaced.

PPPs and the public management of water services: co-existence and competition

In France, PPPs for water services are a long-standing practice. They developed very slowly from 1850 to 1950, then became far more common, especially after the 1970s. Since 1990, four inhabitants out of five in France rely on drinking water supplied by private companies. This description of PPPs must be put into perspective by considering the evolution of people's connection to water networks, in order to compare PPP to public management (see figure below).

PPP and public management for the provision of drinking water in France since 1900



In the nineteenth century, only the largest cities were equipped with water distribution systems. At the beginning of the twentieth century, however, smaller cities began to be similarly equipped, followed by rural areas in the 1930s (Goubert, 1987). Half a century later, all of the 32,000 French rural local authorities were equipped with water networks.

French local authorities have always been in charge of supplying water to their populations. They own the local water supply facilities and choose the regime under which the water supply is organised. Three distinctive regimes have successively dominated the French water supply industry since 1850:

- The concession, in which investment and operation are realized by a private operator, the concessionaire
- The *régie* (direct labour procurement), in which investment and operation are realized by a public body, the local authority

- The *affermage* (lease contract), in which investment costs are borne by the local authority, operation being taken over by a private company, the operator.

Three periods can be distinguished since the middle of the nineteenth century, according to the dominant legal structure:

1850-1900: The concession

The concession was almost the exclusive legal structure in this period, even though some water services were publicly managed (Copper-Royer, 1896). In Lyon, the Compagnie Générale des Eaux had 16,000 users after 30 years of concession, (Villard, 1885). At the national level, the connection rate (the percentage of the total population supplied with drinking water) remained very low, from about 0 per cent in 1850 to 2 per cent in 1900. The concession disappeared at the beginning of the twentieth century, and never enabled universalization of access to drinking water.

1900-1970: The régie

In this period, the *régie* was the dominant regime, experiencing a high growth rate up to 1950. The lease contract was the second most popular regime, and the concession contract disappeared. In 1908, less than half of France's 500 urban water services fell under a lease contract (Burel, 1912). Ten years later, only one-third of cities with more than 5,000 inhabitants were using PPPs for their water services (Monsarrat, 1920), and by 1938, fewer than 1,000 local authorities were engaged in a PPP, as opposed to 6,000 that managed their water services on their own (Guillaume, 1987, Loosdregt, 1990). In 1954, in-house water services supplied 18 million people with drinking water, while water services under PPPs supplied only 7 million people (Loosdregt, 1990, Ministère de l'Agriculture, 1959). The connection rate had grown from 2 per cent in 1900 to 65 per cent, but there were still 21,700 local authorities in need of water networks. They ranged from very isolated municipalities to rapidly growing communities located near cities, which were transforming rural areas into city suburbs. In this context, public and private management continue to co-exist, with PPPs increasing faster than in-house water services – as local authorities that gathered into larger inter-communal organizations preferred this type of regime. The *régie* continued to supply drinking water to a majority of the population, and by 1970, 90 per cent of the French population was supplied with drinking water.

1970-2005: The affermage

In 1973, privately and publicly operated services supplied an equal number of inhabitants; 2 million people were still to be connected to water networks (Ministère de l'Agriculture, 1976). This population was finally connected to water distribution systems under lease contracts. The *affermage* became the dominant regime and it also started to increase at the expense of public management. This meant that it was not only chosen for new water services, but that water services that had been publicly managed since their creation changed to PPPs. As the universalization of water connections was completed in the late 1980s, the alternatives of PPPs or in-house management could no longer peacefully co-exist, and they entered into competition. This competition began to favour PPPs when many of the major cities chose a PPP style of management (Avignon in 1985, Lyon and Paris in 1986, Montpellier in 1989, Toulouse in 1990 and Saint-Etienne in

1992). In the past 30 years, about 10,000 local authorities (8 million inhabitants) have signed PPP contracts to develop their water services. However, 10,000 in-house water services still supply drinking water to 20 per cent of the French population, located in 15,000 municipalities.

PPPs and the economic regulation of drinking water services

Since 1850, PPPs have been regulated in different ways, according to the institution responsible for their regulation, the economic principle enforced to regulate the PPP, and the contract that formalizes it.

From an institutional point of view, water services regulation was, for a century, exclusively conducted by the Conseil d'Etat. This acts as the Supreme Court for the legal affairs of the state, settling conflicts involving a public body. As a water service cannot be privately owned, it is a public body regardless of the way it is managed. Cases involving an in-house managed water service are either brought by or against subcontractors (civil engineering firms, project managers), third parties, or, to some extent, users. Cases involving a PPP-managed water service are initiated either by or against the private partner, the local authority, third parties and, to some extent, users. The Conseil d'Etat's settlements rely on the laws that regulate local authorities (their economic competencies in the broad sense) and the drinking water providers, and also on its jurisprudence, which established the guiding principles of France's public services in the early 1920s.

At the beginning of the 1950s, the state became the main regulator of drinking water services in France. It promoted an administrative regulation until the decentralization laws of 1982, which distributed powers of the centralized state were to local authorities. This administrative regulation translated into PPP contracts and regulated prices. It proceeded through the exclusive capacity of the state to allocate water network funding, without which no rural local authority would have been able to create a water service.

Since 1982, the PPP has been deregulated: contracts and rates are no longer under state control. Water services management has now become a market in which local authorities are supposed to act as the major regulators (Pezon, 2003).

The regulation of water services is carried out by institutions that submit the PPP to one of the two well-known regulatory principles in economics, price-cap and cost-of-service (Milgrom, Roberts, 1992). Each of these principles evaluates the risks endorsed by partners and their level of responsibility in the management of the service differently. Under the price cap principle, a fixed rate is supposed to remain unchanged, regardless of contingencies, until the end of the contract. The private partner is the residual claimant: it is entitled to keep the remaining benefit (or loss) of the activity after the deduction of all expenses. Under the cost-of-service principle, the water rate is adjusted in line with the expenses of the private partner. The local authority is the residual claimant and is given residual rights of control: it is responsible for making decisions regarding the water service facility when neither the contract nor the law has expressly designated a decision-maker.

Until the 1920s, the regulation of PPPs for water services management complied with the price-cap principle. Since then, cost-of-service regulation has been the rule. This change

originated in a consolidation of the principles of public service implemented by the Conseil d'Etat (Pezon, 2003).

Lastly, the PPPs are formalized by a contract whose nature and duration has greatly evolved since 1850. From 1850 to the beginning of the twentieth century, PPPs took the shape of a concession contract. The private partner financed the infrastructure of the service and sought the return of its investment through the operation (water bills). The concession contracts lasted about a century.

Since then, PPPs have been formalized by a lease contract. The owner, the local authority, is responsible for investments, whereas operating costs are taken over by the operator. The public financing of infrastructure invalidates very long-term contracts. From 1951 to 1982, the duration of the lease contract was formally limited to twelve years. But during the 1980s this increased to up to twenty or even thirty years. Since the middle of the 1990s, lease contracts have been negotiated on a shorter basis, of about ten years.

Table 1 presents the historical evolution of these three regulation dimensions. It underlines the gap between changing the regulator and changes in the regulation principle, as well as the symbioses between the regulatory principle and the dominant contract.

**Table 1 : Institutions, contracts and principles of the regulation
of water services in France**

	1850	1920	1950	1982	2005
Institution	C o n s e i l d ' E t a t		State	Local authorities	
Principle	<i>P r i c e c a p</i>		<i>C o s t o f s e r v i c e</i>		
Contract	C o n c e s s i o n		A f f e r m a g e		

This table is also helpful in identifying the institutional and contractual contexts under which PPPs have successively declined and been successful. It suggests that the successful PPP is neither regulated according to the price-cap principle, nor is it a concession contract. Surprisingly, though, it is under these conditions that it was promoted in developing countries during the 1990s, especially in Latin America. In France, this original model was a complete failure. We are now going to analyse the cause of this failure, before identifying the key factors behind the success of the model that has succeeded in France.

The failure of the original PPP model: An analysis through conflicts

The concession contract represented the French original model of PPPs for water-services management. This contract is primarily a way of financing the 'public service'. In

the nineteenth century, ‘public service’ was limited to the collective water supply to public taps: it was the service that local authorities sought to finance through the concession contract. The *concessionnaire* obtained, as a counterpart to its investment, the exclusive right to offer a ‘private service’ in the form of providing private, piped tap water to the population of the municipality (Duroy, 1996). From a technical point of view, the private service was expected to either extend the primary network of the ‘public service’ or to simply connect a water supply to it.

The monopoly of the ‘private service’ depended in a sense on satisfying all primary water needs. The public partner represented these. It had to pay the *concessionnaire* (with a bill) for the supply of water once or twice a year. For users, the ‘public service’ was free. It would also become free for taxpayers after 20 or 25 years, when the bills collected by the *concessionnaire* from the local authority equalled the forecasted investments of setting up the public service.

The concession contract gave local authorities the chance to have a water network without getting into debt and at a secure price. The *concessionnaire* made no profit on the ‘public service’; its profit was rooted in the ‘private service’. The ‘public service’ was justification for the *concessionnaire* to turn water into money. In a certain way, the concession contract created solidarity between those who could afford a private service (previously satisfied by water carriers) and those who were supplied collectively.

This smart contractual arrangement collapsed at the beginning of the twentieth century, when local authorities tried to remove the ‘private service’ and make it the new core of the public water service. The legal cases settled by the Conseil d’Etat show how hard the local authorities tried to make the *concessionnaires* universalize access to tap water, and why the concession contract was so ill-equipped to reach this goal.

With seventy-eight court cases, the second half of the nineteenth century saw the most conflict between public and private partnerships. Among those judgements, twenty-nine originated from municipalities wanting to extend their *concessionnaires*’ contractual obligations (network extension, water quality improvement, water quantity increase), twenty-one originated from municipalities wanting to lower the rate applied to users, and eighteen originated from municipalities wanting to terminate the Concession contract before its term.

The Conseil d’Etat systematically considered that there were no limits to the parties’ rationality during the negotiation stage.² It considered concession contracts to be complete contracts: no unforeseen contingencies could be invoked to justify renegotiations *ex post* relating to the allocation of residual rights of control. In particular:

- The rate, the quantity, and the quality of the water supplied were set once for all.
- None of the parties could invoke unforeseen contingencies to curb the contractual clauses.

² See Annex A

- There was to be no revision and no hardship clause.
- The price cap could not be increased or decreased.
- The *cessionnaire* could pay damages should it not comply with its contractual obligations.

The Conseil d'Etat systematically invited both parties to negotiate any amendment to the contracts.³ It never allocated any residual rights of control to any party to extend the scope of the initial contract. This applied in particular to local authorities, which frequently asked the Conseil d'Etat to enforce extra-contractual obligations (network extension, water quality improvement, lowering rates for 'private' water).

None of the parties could be forced to accept an extension of the contract, which would decrease the initial contract's profitability.⁴ In that respect, municipalities claiming extension of the *cessionnaires'* duties (network extension, water quality improvement) were invited by the Conseil d'Etat to provide the *cessionnaires* with a compensation scheme in line with the initial one, implicitly denying any economies of scale or scope.

The Conseil d'Etat set restrictions on contract transfer and termination.⁵ It always denied the *cessionnaire* the right to sell its contractual rights and obligations to a third party without the municipality approving the deal. This was a consequence of the *intuitu personae* characteristic of the concession contract, whereby the *cessionnaire* was selected by the municipality by mutual agreement. Only a judge could formally decide to terminate a concession contract, based on consideration and evidence that the *cessionnaire* had stopped fulfilling its contractual duties (i.e had stopped operating). It should be noted that the municipality was not entitled to terminate the concession contract on its own, even if it had become obvious that the *cessionnaire* had lost the ability to fulfil its part of the contract. Once the termination was decided on, the *cessionnaire* was not guaranteed even partial recovery of the amount invested in the concession.

Lastly, the Conseil d'Etat gave *cessionnaires* the right to charge users for extra contractual services.⁶ Users often asked to be supplied with a greater volume of water, or to meter their consumption, when the concession contract had foreseen only the provision of a fixed quantity of water at a fixed rate, whatever their effective consumption. The following should be noted:

- The Conseil d'Etat granted *cessionnaires* the capacity to sell additional services (metered consumption, variable quantity) at higher rates than contractual rates.
- Most Concession contracts involved a profit-sharing scheme by which the *cessionnaire* shared with the municipality profits made beyond a certain level of sales.

³ See Annex B

⁴ See Annex C

⁵ See Annex D.

⁶ See Annex E.

- The Conseil d'Etat prevented municipalities from undertaking legal action on behalf of 'private' water users.
- Commercial conflicts between the *cessionnaire* and 'private' water users were considered by the Conseil d'Etat as being outside its jurisdiction.

The reaction of the municipalities to Conseil d'Etat settlements that found *cessionnaires* were not obliged to finance water service extension beyond what was stated in the original agreement was threefold:

- A few local authorities committed to concession contracts bought their *cessionnaires*' operating rights back through very lengthy and conflictual processes (11 judgements, 13 to 25 years of procedure).⁷ The position of the Conseil d'Etat concerning the financial settlement and conditions of buying back operating rights, clearly in favour of *cessionnaires*, prevented most municipalities from buying their rights back (Pezon, 2000).
- Other local authorities committed in PPPs started financing the extension of water supply facilities themselves, progressively turning their concession contract into an *affermage* contract, in which the operator was mainly concerned with providing operating service.
- Local authorities engaged in the process of creating a new water service opted for the *régie*, under which the local authority retains responsibility for investment and operation.

After half a century, the system based upon the triptych of the Conseil d'Etat, price-cap regulations and concession contracts resulted in very poor results in terms of connection rates.

This historical perspective shows that the tandem of concession contracts and price-cap regulations applied to water service is incompatible with the universalization of drinking water access. The risks the *cessionnaire* took on with a fixed-price contract drove the partners to describe precisely the actions that the *cessionnaire* would have to undertake to reach pre-determined objectives. *Cessionnaires* managed their risks through a supposedly complete contract. But this interpretation was incompatible with the public water service once tap water supplanted collective supply as the objective of local authorities. By definition, a public service evolves permanently. Who could foresee all the decisions that would have to be taken to comply with principles such as continuity of service or the need to adapt the service to new technical innovations ten years down the road? The actions of the *cessionnaire* cannot be dictated in full through a single contract unless its duration is reduced, which contravenes laws regarding the private financing of long-term infrastructure. The uncertainty of costs leads us to reconsider the way risks are shared between partners, as they can be assumed by the public partner, by the local authority or by the water users, depending on whether the tax or the rate adjusts the revenue to the costs of the water service.

⁷ See Annex F.

The key factors of success of the French model of PPP for water management

The successful French PPP model relies on the *affermage*, or lease contract. This contract became slowly more popular until the 1950s, then increased rapidly in popularity to become the dominant regime by the early 1970s. Surprisingly, the Conseil d'Etat has not been called upon to settle any conflict opposing a municipality and an operator committed in an *affermage* contract. We might expect the *affermage* regime, which splits responsibilities and allocates investment decisions to one party (the local authority) and operating decisions to the other (the operator), to be a fairly conflictual arrangement: when decisions regarding investment and operations are being split, there is evidence that optimality will not be reached. The investing party tries to minimize its investment, with the risk of inflating operating costs, and, conversely, the operating party tries to obtain equipment redundancy in order to minimize its effort and costs. Therefore we might expect to see many conflicts and subsequent Conseil d'Etat decisions. However, this is not the case. The success of PPPs in providing water services management in France has relied on very specific conditions that have pre-empted such conflicts.

The first key factor of success lies in the public financing of investments. In other words, the PPP has worked in France because the main financial risks have been taken on by local authorities. Consequently, the private partner has had no grounds to claim a profit based on capital it has not financed, as was the case under the concession regime. As no return is expected from public financing, prices have been kept to a minimum.

The second key success factor lies in cost-of-service regulation. The private partner takes on only the operational risks. The cost-of-service principle applies to the operation of the water service, not the investment. The adjustment of price rates to costs is determined through a multi-criteria formula indexed to the main components of the operating costs: energy, wages and chemical products. As users' bills are proportionate to the volume of water distributed, the increasing of revenue results from an extension of the water service in size (inter-municipal services), number of connections and water consumption. The distribution of tap water becomes a mass-activity: the more the private partners distribute water, the more profit they make. Their interest is therefore to increase the number of users and the number of services they operate, instead of seeking to increase the profit rate of a smaller number of users. This is not difficult, because they do not have to finance these investments.

A third key factor of success lies in the way regulations are implemented. In 1951, a standard *affermage* contract was defined at the national level. This standardization favoured the expansion of PPPs in two ways. First, it came in a context in which few water companies had survived the municipal socialism movement and the Second World War. With a standardized PPP agreement they were in a better position to capitalize on their experience in negotiation and to rationalize their internal organization than they would be if faced with varying kinds of PPPs. Second, the standard *affermage* contract gives the operator a substantial role in the design and construction of the facility it is committed to operating. This pre-empts the potential conflicts that might have arisen from the lease contract and the division of responsibilities it embodied.

A fourth key factor of success lies in the administrative regulation of water rates at the national level, implemented at the local level by the prefect (representing the State in each

county). The standard *affermage* contract relies on a rate formula that automatically adjusts prices to costs. Moreover, it translates into a rate level that must be approved by the prefect. If the rate formula results into an overly high rate increase, prefects are entitled to fix a lower rate than the contractual price. In such a system, local authorities hardly take on the responsibility that usually falls to the public partner engaged in cost-of-service regulation. In reality, regulation is controlled by the state and its local representatives. This gives local authorities interested in PPPs a guarantee that their water rates will remain reasonable.

A fifth key factor of success lies in the fact that this model has been strongly promoted by those in charge of allocating water funding. Rural local authorities clearly depend on public funding to set up water networks. Only those that intended to create a service in compliance with the service planned by the Genie Rural Corps of Engineers would have the opportunity of being funded. These engineers define, in particular, the water service territory and its management (in-house or PPP). They encourage the latter. For them – at the state and local levels – it is the best way to overcome the rural local authorities' lack of technical and management skills. To some extent, a PPP model built with only a few water companies is very helpful in pursuing a rationalized national development of water infrastructures, in spite of 36,000 local authorities (Pezon, 2004).

The last key factor of success lies in the capacity of PPPs to appeal to the different priorities of local authorities, water companies and the state. The state finds in the PPP a way to reach its two objectives: the rationalized, national development of water infrastructures and the recovery of at least some of the costs of water services. The existence of water companies that operate services across the national territory overcomes vain attempts at reform at the local administrative level. In fact, through PPPs, water services can be managed on a larger scale than that of the municipal territory, even when local authorities have not grouped into an inter-municipal organization. Cost-of-service regulation guarantees recovery of the operating costs taken on by private partners. On the other hand, local authorities can benefit from the large scale of the operation of their services without decreasing their power as they would by grouping into inter-municipal organizations. Moreover, for the national regulator, PPPs provide a stronger guarantee that their operating costs will be recovered than would public management, and gives local authorities the political advantage that a well-managed and low-rate water service offers.

These six key factors of success allowed the deployment of a rent-sharing scheme favourable to all parties: operators were in a position to sell construction and operation services at relatively attractive rates; municipalities were able to fulfil their role of developing local infrastructures, and were in a position charge end-users reasonably; users got drinking water at very low rates (enough to cover the operating costs of water services).

Conclusion

The difficulties recent met by efforts to export the concession contract for water services management could have in part have been foreseen, as they are very similar to those that led to the failure of the concession in France a century ago. French municipalities gave up on this contract, which supposed enforcement of the full-cost-recovery principle, and

accepted that public financing was necessary for the creation or the development of their water services. The PPP has become the predominant way of operating water services in France, dependant on six very specific key factors for its success. With the deregulation of the water sector in the mid-1980s, local authorities were, however, on their own to frame new relationships with three water companies. The legitimacy of the PPP is still contested, especially by users, due to its lack of regulation. The Local Authorities Law of 1999 and the forthcoming European Framework, which aims to increase PPP transparency, might pave the way for a new regulatory framework for water services management in France.

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Annexes: Court cases examined

A: Conseil d'Etat decisions on completeness of Concession contracts

<i>Year</i>	<i>Date</i>	<i>Opposing Parties</i>
1875	29 Jan.	Ville du Havre v. Compagnie des Eaux du Havre
1876	11 Feb.	City of Marquise v. Sieur Kent
1877	09 Feb.	Sieurs Fortin-Hermann et Cie v. City of Laon
1878	27 Dec.	Compagnie Générale des Eaux v. City of Nantes
1879	28 Feb.	City of Melun v. Compagnie des Eaux
1879	13 Jun.	City of Cannes v. Crédit Compagnie
1879	12 Aug.	Sieur Branellec v. City of Brest
1882	24 Mar.	Sieurs Dalifol, Huet et autres v. City of Monthléry
1883	11 May	Compagnie Générale des Eaux v. City of Nantes
1883	07 Aug.	City of Meaux v. Société des Eaux de Meaux
1889	10 May	Compagnie Générale des Eaux v. Ville d'Ancenis
1890	02 May	Compagnie Générale des Eaux v. Commune du Petit-Quevilly
1891	13 Feb.	Sieurs Goffinon, Rozier v. City of Beaumont-sur-Oise
1891	15 May	Sieur Joncla v. Commune de Grenade
1893	03 Mar.	Commune de Clichy v. Compagnie Générale des Eaux
1893	19 May	Ville d'Aix-les-bains v. Compagnie des Travaux Hydrauliques
1895	15 Nov.	Compagnie Générale des Eaux v. City of Toulon
1896	12 Jun.	City of Bastia v. Société d'Entreprise Générale des Distributions et Concessions d'Eau et de Gaz
1898	18 Feb.	City of Douai v. Société des Eaux Saphore
1912	22 Nov.	City of Rouen v. Compagnie Générale des Eaux

B: Conseil d'Etat decisions inviting the Parties to negotiate amendments

<i>Year</i>	<i>Date</i>	<i>Opposing Parties</i>
1875	29 Jan.	Ville du Havre v. Compagnie des Eaux du Havre
1877	09 Feb.	Sieurs Fortin-Hermann et Cie v. City of Laon
1882	24 Mar.	Sieurs Dalifol, Huet et autres v. City of Monthléry
1893	19 May	Ville d'Aix-les-bains v. Compagnie des Travaux Hydrauliques
1894	11 Jul.	City of Courtenay v. Société des Eaux et du Gaz
1910	28 Jan.	Commune de Sainte Maxime sur Mer v. Sieur Jeffery
1923	26 Jan.	Compagnie Générale des Eaux v. City of Lyon

C: Conseil D'etat decisions outlining that the initial terms of the contract serve as a *status quo*

<i>Year</i>	<i>Date</i>	<i>Opposing Parties</i>
1877	9 Feb.	Sieurs Fortin-Hermann et Cie v. City of Laon
1890	2 May	Compagnie Générale des Eaux v. Commune du Petit-Quevilly
1891	13 Feb.	Sieurs Goffinon, Rozier v. City of Beaumont-sur-Oise
1896	21 Feb.	Compagnie des Eaux de la Banlieue de Paris v. Commune d'Asnières
1898	18 Feb.	City of Douai v. Société des Eaux Saphore
1911	27 Jan.	Compagnie Générale des Eaux v. City of Rouen
1912	22 Nov.	City of Rouen v. Compagnie Générale des Eaux
1924	28 May	City of Rouen v. Compagnie Générale des Eaux

D: Conseil d'Etat decisions restricting contracts transfer and termination

<i>Year</i>	<i>Date</i>	<i>Opposing Parties</i>
1876	11 Feb.	City of Marquise v. Sieur Kent
1878	08 Feb.	Sieur Pasquet v. City of Bourges
1882	24 Mar.	Sieurs Dalifol, Huet et autres v. City of Monthléry
1884	11 Jul.	Compagnie des Eaux d'Oran v. Ville d'Oran
1894	11 Jul.	City of Courtenay v. Société des Eaux et du Gaz
1895	06 Apr.	Sieur Deshayes v. City of Lorient
1898	01 Jul.	Ville d'Aix-les-Bains v. Compagnie des Travaux Hydrauliques
1902	22 Mar.	Société Départementale des Eaux de Source v. City of Brie-Comte-Robert
1905	20 Jan.	Compagnie Départementale des Eaux et Services Municipaux v. City of Langres
1912	22 Nov.	City of Rouen v. Compagnie Générale des Eaux
1919	26 Dec.	Compagnie des Eaux de Bayonne v. City of Bayonne
1923	02 Nov.	Compagnie des eaux de Bayonne v. City of Bayonne
1924	28 May	City of Rouen v. Compagnie Générale des Eaux

E: Conseil d'Etat decisions on Concessionaire's role in price setting and the profit sharing scheme

<i>Year</i>	<i>Date</i>	<i>Opposing Parties</i>
1868	30 Jan.	Sieur Pradier v. Compagnie Générale des Eaux
1877	09 Feb.	Sieurs Fortin-Hermann et Cie v. City of Laon
1878	08 Feb.	Sieur Pasquet v. City of Bourges
1879	28 Feb.	City of Melun v. Compagnie des Eaux
1879	12 Aug.	Sieur Branellec v. City of Brest
1883	20 Jul.	Ville d'Issoudun v. Sieurs Badois et Berthier
1884	25 Jul.	Compagnie des Eaux du Havre v. Ville du Havre
1885	04 Dec.	Commune de Saint-mandé v. Compagnie Générale des Eaux
1888	08 Aug.	Commune de Neuilly-sur-Seine v. Compagnie Générale des Eaux
1893	03 Mar.	Commune de Clichy v. Compagnie Générale des Eaux
1895	06 Apr.	Sieur Deshayes v. City of Lorient
1902	13 Jun.	Sieur Sinet et commune de Sceaux v. Compagnie Générale des Eaux
1903	20 Nov.	Compagnie des eaux de Creil v. City of Creil
1908	14 Feb.	Commune de Nanterre v. Compagnie des Eaux de la Banlieue de Paris
1911	27 Jan.	Compagnie Générale des Eaux v. City of Rouen

F: Conseil d'Etat conditions upon premature contract termination

<i>Year</i>	<i>Date</i>	<i>Opposing Parties</i>
1900	6-avr.	City of Nantes v. Compagnie Générale des Eaux
1906	23 Feb.	Compagnie Générale des Eaux/City of Lyon v. City of Lyon/Compagnie Générale des Eaux
1908	20 Mar.	Compagnie Générale des Eaux v. City of Nantes
1911	10 Mar.	Compagnie Générale des Eaux v. City of Lyon
1921	4 Mar.	Compagnie Générale des Eaux v. City of Toulon
1923	26 Jan.	Compagnie Générale des Eaux v. City of Lyon
1924	28 May	City of Rouen v. Compagnie Générale des Eaux
1925	6 Nov.	Compagnie Générale des Eaux v. City of Rouen
1926	13 Jan.	Compagnie des Eaux de la City of Creil v. City of Creil
1928	09 Nov.	Compagnie Générale des Eaux v. Villes de Toulon et de La Seyne
1934	08 Jun.	City of Toulon v. Compagnie Générale des Eaux et City of La Seyne

Water management in the cities of Brazil: Conflicts and new opportunities in regulation

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Introduction

Access to water and sanitation services is one of the most pressing concerns in Brazil today. Significant social inequalities remain even in Brazil's large cities, where a total absence of access to system services still exists in some areas. According to the data for 2000 from the Instituto Brasileiro de Geografia e Estatística (IBGE, Brazilian Institute of Geography and Statistics), the absence of water system services affects about ten million households, most of which are located in cities. Indeed, nearly 80 per cent of the Brazilian population now live in cities.

The country has had to deal with complex circumstances and now faces an accumulation of deficiencies. This explains the difficulty of those responsible for water and sanitation to move from words to deeds, and to carry out policies capable of universalising services and improving effectively the living conditions of the population. Public officials continuously extend the deadlines set for meeting social objectives, such as universal access to drinking water and sanitation. The economic crisis and the need to decrease public spending to lower the fiscal deficit – a necessity imposed on Brazil by international finance organizations – are invariably offered as arguments for reducing investment in public policies of a social nature. The situation tends to worsen as the population and the number of poor people increase. Several of the country's cities are consequently seeing new slums appear, poor neighbourhoods that lack access to water and sanitation and whose infant mortality rate is exceptionally high.

Since the beginning of the 1990s, the federal government has tried to make access to services more dependable by introducing new management models. During the two terms of President Cardoso (1994–1997 and 1998–2001), certain officials in the

government called for the delegation of services to private firms, although no new national policy for water and sanitation was put forward. The last nationwide policy dates from the 1970s: the Plano Nacional de Saneamento (PLANASA, National Sanitation Plan), which represented the military government's policy covering water and sanitation. Innovations in public policy on water and sanitation have had to be introduced at the municipal management level.

Since passage of the law of 1995, municipalities have made the first steps towards the delegation of services to the private sector. However, the number of concessions remains quite limited. According to recent data (2003), only thirty-one municipalities have delegated their water and sanitary services to private operators. This represents barely 5 per cent of the total population connected to water and sanitation networks. As for the public *Companhias Estaduais de Saneamento Básico* (CESBs, State Basic Sanitation Companies) created by PLANASA at the state level, only two have been partially privatized: Paraná's state water company (SANEPAR), managed by a firm called Domino (a joint venture of Vivendi and the Brazilian groups Andrade Gutierrez, Opportunity and Copel), which holds 39.7 per cent of the company's shares; and Tocantins's state water company (SANEANTINS), of which 76.5 per cent of the shares belong to the private group, EMSA.⁸

However, the essential problem is that Brazil's large cities extend into several municipalities, a situation that leads to institutional conflicts.

Institutional Conflicts

A first point worth more detailed analysis concerns jurisdictional conflicts between municipalities, which according to Brazilian law are responsible for the delivery of services, and the CESBs.

In the 1970s, within the framework of PLANASA, municipalities were required to delegate services operation to the CESBs in order to obtain federal government funding. In the second half of the 1980s, this model encountered major difficulties in financing and in the expansion of services. By the 1990s, coinciding with the growth of the democratic process in Brazil, heavy criticism was being levelled at the centralized model of services management. Indeed, the democratization of public policies was understood to mean their decentralization. According to the consensus view, decentralized delivery of public services would be more democratic, more efficient, and would raise the well-being of Brazilian society.

Criticism came from the municipalities as well as from the Programa de Modernização do Setor Saneamento (PMSS, Water Sector Modernization Programme), which was

⁸ Among the private groups operating in Brazil there are three types of capital investor: large international water companies (the French companies Veolia and Suez-Ondeo, the Spanish company Aguas de Barcelona, the English company Water International, the Portuguese company Aguas de Portugal and the North American company Enron); private national or international banks (BNP Paribas, Banco Fator, Wald e Associados, Banco Patrimônio, Salomon Smith Barney Holding, Capitaltec, Banco Essi and Deutsche Bank); and Brazilian public works companies that already worked for CESBs at the time of PLANASA (CBPO, Odebrecht, etc.).

started in 1994. The PMSS aimed at greater flexibility in the existing management structures. Created at the prompting of the World Bank, the programme meant to redress the rigidity of the military government's management model, which was still in place. Recognizing, moreover, the enormous differences between different regions of the country, the PMSS advocated the possible coexistence of several management models: it was up to the municipalities and the states to choose their management model from a range of possibilities made available to them, including the concession of services to private operators. The PMSS did not, therefore, represent an interventionist policy. In fact, as of the latter half of the 1980s there was no longer any national plan to determine the priority of investments. Action was taken without coordination between the different governmental agencies involved. There were no tools to evaluate the use of financial resources or the social effectiveness of the investments made.⁹

Nevertheless, the concession of services to CESBs remains the dominant model: 71 per cent of the drinking water systems of Brazil's municipalities are managed by state companies, with or without concession contracts. For sanitation, the percentage drops to 14.5 per cent; 84.5 per cent of Brazil's municipalities are without concession contracts for sanitation services, which means that the services, when they exist, are managed directly by the municipalities, and are much less developed.

Territorial conflicts linked with the state-centralized management model involve the state's relationship with the planning and regulation of urban land use, which falls under municipal authority. However, it can be seen that the institutional and technical organization of water and sanitation systems do not respond to the directives of urban policy, whether these directives are made at the municipal or city level. The supply-side logic of water and sanitation services is sector-based and is not necessarily related to local or urban territorial development planning. The urban process and, therefore, urban planning and management cannot be dissociated from the territory, even when the most elementary ideas of functionality are at issue. On the other hand, most often measures concerning the increase of supply to a water system are determined without taking into account the objective characteristics of the territory (Silva, 2004). This sector-based logic is maintained by the institutional framework of concession contracts, a framework that does not allow municipalities any real possibility of setting the priorities for service and system expansion within their jurisdiction. A striking asymmetry of power exists, reinforced by these contracts, which leads in most cases to a situation in which large companies with service concessions pursue a sector-based strategy without yielding to the directives established by the master planning of the municipalities. Large companies determine their investment plans autonomously, without consultation with the municipalities. Only in certain cases do these plans coincide with the urban development directives drawn up at the municipal level.

⁹ Since 1995 the objective of the PMSS has been to establish universal access and to improve the quality of services through research and efficient management. It maintains two lines of independent but complementary action. The first aims at the institutional restructuring of the sector through the development of regulatory measures, new financing mechanisms and possible institutional models for the management of services. The second line of action aims at the financial, technical and organizational modernization of certain CESBs, with the goal of setting examples for other CESBs. To this end, investments in CESBs have been made with the assistance of the World Bank and local financing.

Despite the decentralizing tendency of public policy that has defined Brazil since the Constitution of 1988, and despite the opportunity to break with or, simply, not to renew concession contracts with the CESBs, no sizeable move towards the municipalization of services has yet been seen. Even the signing of new concession contracts under new terms with the CESBs, terms which would give the municipalities means to participate more directly in services management, does not seem to be a widespread tendency. For small municipalities, whose services are in most cases insufficient and whose effective management depends on cross-subsidization, the municipalization of management is not a viable choice. For large municipalities where services are profitable, the municipalization process almost always gives rise to conflict with the CESBs. The authoritarian nature of the concession contracts protects the interests of public companies to the detriment of the municipalities'. Legal action is complicated and the CESBs demand various kinds of compensation for investments made and infrastructures installed, which makes it difficult for municipalities to break with a contract and resume services management.¹⁰ A considerable number of municipalities therefore prefer to maintain their concessions to CESBs on the same contractual terms, so limiting their responsibilities towards the users of water and for sanitation services management.

The conflicts arising from the municipal recovery of concessions entail not only potentially lengthy legal disputes, but also genuine political disputes between city and state governments. This latter conflict typically arises when the mayors of capital cities are not members of the same party as the state governors. State companies earn the greatest share of their profits in capital cities. CESBs obviously do not want to lose capital-city concessions, but these cities demand more investment and sometimes challenge the policy of cross-subsidization practised by the companies, whose earnings from services operation in the capitals end up financing investments in other municipalities of the urban area, or even of the state, at the expense of service quality in the cities. In the state of Rio de Janeiro, for example, the municipality's Office of Public Works each year issues a large number of fines (around 1,660 in 2001) to the state-run company CEDAE for leaks and for the poor quality of the water and sewage systems, problems that lead to flooding and road damage.

The move to protect municipal autonomy and municipal involvement in services management is led by the Associação Nacional dos Serviços Municipais de Saneamento (ASSEMAE, National Association of Municipal Sanitation), an association founded in 1984, which brings together 1,800 municipalities that directly manage their water and sanitation services. ASSEMAE calls for the municipalization of management (although not in every case) by emphasizing the need to recognize the variety of technical and financial resources that define Brazilian communities. In 1997 the association joined with other social organizations to create the Frente Nacional de Saneamento Ambiental (FNSA, National Front for Environmental Sanitation). The Front brings together different political forces in civil society, among which include the sector's trade unions,

¹⁰ However, the city council of Diadema, citing article 293 of the São Paulo State Constitution, has been able to avoid immediate payment of compensation for investments made by the state company SABESP. Article 293 provides a period of twenty-five years for payment of the compensation, following an audit completed by the City Secretariat and the Secretariat of the National Treasury (see Vargas, 1996).

ASSEMAE, nongovernmental organizations, consumer advocacy groups and an organization mobilizing for the right to fair housing. The Front has led the movement against the privatization of services and for public municipal management.

With the election of Lula da Silva, the Front has made its voice heard within the national government. The National Secretariat of Environmental Sanitation of the Ministry of Cities has included Front members. The Lula government also created the National Cities Conference, a large gathering held in October 2003 in which the public participated in formulating urban policies. It was preceded by a widespread participatory process, involving first the municipalities then the states, through which the 2,510 members of the National Conference were elected. The principal goals of the Conference were to discuss water and sanitation policies and to elect the National Cities Council. The Council of seventy-one members elected during the Conference (forty-one representatives from diverse segments of civil society and thirty from governmental authorities), together with a team of technical experts from the Ministry, then formulated the National Urban Development Policy, as well as policies for the water and sanitation, housing, and transport sectors.

Based on the Conference debates and on a new round of public consultations involving public meetings in each state, the National Secretariat of Environmental Sanitation drafted a bill for the sector (Bill no. 5296/05). The bill, currently being debated in the National Congress, reinforces the responsibility of local or municipal authorities for water and sanitation services. But clearly identifying the municipality as the authority responsible for services management does not eliminate possible conflicts with CESBs. In most Brazilian urban areas, state companies remain responsible for drinking-water production and sewage treatment, and they manage large, currently-existing infrastructures. Municipalities wanting to manage their services themselves will be forced to buy water in bulk from state companies. In most cases, the price per cubic metre of water remains a source of conflict between CESBs and the municipalities. Such is true of the municipalities of Niteroi in Rio de Janeiro state as well as of various municipalities of São Paulo.

Conflicts involving modes of financing water and sanitation services

A second source of conflict involves the financing of universal access after the failure of the cross-subsidization model set up by the CESBs, to which reference has already been made. This system of cross-subsidization was based on the idea that, in a large country with significant social inequalities, as is the case in Brazil, the various costs associated with the operation of services is enormous. Accordingly, the larger the size of the territory administered by a company, the more evenly distributed the system of operation would be. In each state, areas in which costs could not be recovered through tariffs would be subsidized by profits from areas producing surplus revenue. This was not viewed as a direct transfer from rich to poor areas, even if in most cases such was the case. In certain areas, economies of scale sufficiently lowered marginal costs, generating revenue that was transferred to areas where technical difficulties increased operating expenses.

The current major problem is the saturation of the benefits of cross-subsidization. Indeed, in this kind of system it is not possible to fully identify the different areas of

demand, as the structure of the services-supply system is integrated. The difficulty has in the past been dealt with through an increasing block rate tariff structure: the essential quantities (for drinking water and sanitation) for each household were subsidized for all users, and the volume corresponding to non-essential uses was billed at a rate equal or superior to the marginal costs of production. However, the potential of the cross-subsidization system remains limited with regard to the extension of water and sanitation networks to poorer urban areas. In nearly all of Brazil's cities, access to services is universal in middle-class and well-to-do areas, whereas poorer neighbourhoods remain without service. Consequently, it is difficult to generate new cross-subsidies for the extension of services because the most profitable supply remains stagnant. On the other hand, the demands of the poorest areas continue to increase.

But the limits of cross-subsidization cannot justify abandoning it, because doing so would only exacerbate the disparity of services available in different areas. Such a problem arises especially with regard to the municipalization of services: in certain of the poorer states, services in the capital equal those of almost all the other municipalities served. One solution involves the federal government, which could finance the extension of water and sanitation networks and services to poorer areas. But, again, conflicts arise, and the municipalities are not particularly optimistic. The last ten years have, in fact, seen successive financing restrictions on state companies and on municipal services. Access to the Fundo de Garantia de Tempo de Serviço (FGTS, Severance Pay Fund), the principal form of financial assistance for investments in water and sanitation, has been blocked several times due to austerity measures that have prohibited public agencies from borrowing from the fund. The federal government justified this policy by asserting that public companies, municipalities and states did not have the means to reimburse the loans. But according to Marcos Montenegro's analysis, the government instead reserved access to the fund for itself in order to pay interest on the public debt. The prospect of increasing investment in the sector under Lula's government is all the less encouraging given that the Fiscal Responsibility Law has resulted in the economic policy adopted by the Ministry of Finance setting major restrictions on public spending.

In any case, the actual investment capacity of CESBs is limited because they are closed-end companies, indebted and subject to elevated interest rates on their loans. Marcos Thadeu Abicalil (2004) has shown that on average 19.8 per cent of CESB income currently goes to investment and 23.6 per cent to loan reimbursement. With regard to the application of tariffs and water consumption, the situation is equally problematic: in the last decade water consumption in the top consumption bracket has dropped by 18 per cent, whereas the number of users in the lowest bracket, which yields the least profit, rose by 30 per cent. Revenue per customer has consequently fallen by 28.3 per cent.

With the loss in income on the one hand, and on the other hand a rise in expenditure due to changes in the tax system, changes that have resulted in both higher taxes and increased labour costs, CESBs have found it more and more difficult to recover costs. According to data concerning 2003, provided by the Sistema Nacional de Informações sobre Saneamento (SNIS, National Information System of Water and Sanitation), out of twenty-five CESBs four companies from northern and northeastern Brazil, as well as the state company of Rio de Janeiro, CEDAE, were not able to produce revenue sufficient to cover total expenditure. According to the data of the National Secretariat of Environmental Sanitation of the Ministry of Cities, only six companies found themselves

in a situation financially sound enough to repay their loans (São Paulo, Paraná, Brasília, Minas Gerais, Espírito Santo and Ceará). It should also be pointed out that in certain states, such as Rio de Janeiro, the revenue of CESBs (in this case CEDAE) is diverted to other sectors of the public administration. These CESBs have been unable to develop a public, corporate structure independent of the political concerns of the state administration.

User conflicts: Exclusion from services

A third source of conflicts concerns users. City residents who would like to connect to a water and sanitation system but who without a system of subsidies or social assistance are often unable to pay the real price of services. In Brazil, deficiencies in *saneamento* are predominantly found in rural areas, often on the periphery of existing systems. A portion of these deficiencies can be also found in municipalities of less than 20,000 residents and on the outskirts of medium and large cities. The following analysis will look in particular at these latter situations.

According to the IBGE, in 2000, 10.9 per cent of Brazil's urban population and 82.2 per cent of the rural population did not have access to a public drinking-water distribution system. Moreover, in nearly all regions of the country (with the exception of the southeast), more than 60 per cent of the urban population and 90 per cent of the rural population were not connected to a sewage system. Based on the IBGE data, and comparing developments in services access between 1991 and 2000, chapter five of the United Nations Development Programme (UNDP) report, *Relatório de Desenvolvimento Humano 2003*, shows that there were improvements in access both in absolute terms and in terms of the percentages: the percentage of the population without access to drinking water decreased from 32 per cent in 1991 to 24.2 per cent in 2000. Only in the northern region of the country was there no decrease. In the rural areas of all the regions of the country, the percentage of the population without access declined. As for sanitation, the same UNDP report shows improved access for the urban population, the percentage without access to a sewage system dropping from 55.6 per cent in 1991 to 46.2 per cent in 2000. On the other hand, in rural areas the situation worsened, with a rise of 0.5 per cent in the population without access to a sewage system.

More recent data shows that even in urban areas, access to sewage systems has declined. According to the SNIS, the percentage of residents with service decreased by 0.6 per cent in urban areas between 2001 and 2003. The urban deficit of services access is found on the outskirts of medium-sized and large cities and in neighbourhoods where illegal housing predominates. The shortage is concentrated among the poorest residents, who cannot afford to pay for system expansion, let alone for a connection.

Moreover, when a policy of recovering costs through tariffs is pursued, the wealthier classes and the industrial sector, which are the largest consumers of piped water, have a great influence over the choice of new investments. They also attract the greatest portion of subsidies, because tariffs do not reflect the growing costs of expanding water production systems. The majority of Brazilian cities offer examples of this situation, with the water service available to the city's various social groups differing both in terms of the quality and quantity of supply.

With the growing number of urban poor, a symptom of the increasingly uncertain entry of a large part of the urban population onto the job market, rising water and sanitation costs have led to the exclusion of a large number of users from the public system and to an increase in alternative modes of supply, such as water-well drilling. In these areas there has also been a rise in illegal water connections and other methods of illicit access to services. It is difficult for the companies responsible for services to identify and thereby to combat these kinds of illegal connections.

Illegal connections and water-well drilling represent not only a loss in revenue to the companies involved, but also a health risk to the population at large. According to information provided by SABESP, in the state of São Paulo there are illegal connections in most of the municipalities for whose services SABESP is responsible. The precarious connections damage the quality of the water that is distributed: water parasites can enter the mains and water quality can no longer be guaranteed at the end of the line. Moreover, a significant portion of these connections are made in areas liable to flooding, which causes a reflux of contaminated water flowing into the distribution system. In the favelas and other neighbourhoods of the Rio area, where illegal housing structures are common, a maze of ground-laid plastic pipes forms a veritable network of illicit connections. The network is subject to frequent contamination problems.

Illegal connections also cause leaks, which lower the water pressure in the system. Leaks lead to water damage that in turn weaken building structures. As for wells, there is almost never any way to verify their water quality. The groundwater may be polluted and the danger of well contamination is high. Furthermore, this practice raises the price of electricity for low-income populations, as electric pumps must be used daily to fill water storage tanks.

In most large cities, the number of users excluded from services continues to grow. This provokes two different reactions: on the one hand, there are those who seek alternative and/or illegal solutions in order to have access to water, and who, being unable to pay for access, come to accept this situation; on the other hand, there are those who demand access to public services and are willing to pay tariffs set proportionate to their income. In both cases conflicts arise between users and those responsible for public services, conflicts in which relations between the two groups tend to deteriorate.

Environmental conflicts

A fourth source of conflicts involves environmental issues. Recent decades have seen a sharp increase in water pollution, as sanitation services have fallen behind drinking-water services. CESBs initially adopted a technical model based on water-supply expansion in the absence of integrated resource planning. Beyond the contamination of water systems from wastewater, the model has resulted in various problems: the pollution of waterways due to the discharge of wastewater into rainwater sewers; the pollution of groundwater due to illegal utilization; the pollution of rivers, which are a source of supply, due to uncontrolled urban sprawl into catchment areas.

A first task is to improve water collection and wastewater treatment systems. What are the technical and financial stakes involved? Resource contamination raises the issue of having to choose technologies and systems management. Most projects aim at the

construction of large-scale treatment plants. However, even if the plants function well, the preservation of water quality cannot be guaranteed, because there is no real control of non-point source pollution (polluted runoff), which results from uncompleted, poorly-maintained and antiquated systems of collecting wastewater, and from collected rainwater bring contaminated by untreated wastewater (from household and industrial sources).

Another important issue involves the sustainable management of resources. Although relatively abundant in Brazil, resources are not evenly distributed; certain areas experience recurrent shortages of water, as is the case in the semi-arid region in the northeast of the country. However, aside from the natural availability of water, many of the country's urban areas encounter water shortages due to the misuse of the resource. The principal problems are as follows:

- the priority given to water used in the production of electricity, a priority which in the case of the São Paulo urban area has determined the choice of the infrastructures constructed and the operating model of the system;
- the use of water by large industrial consumers, because of the volume of water collected and the resulting pollution;
- losses in water supply systems, from water catchment to distribution.

Water waste in the existing systems is very high. One way to gauge water losses is to examine the difference between the volume of water distributed and the volume of water for which users are actually charged. According to the SNIS, in 2003 39.4 per cent of the water billed was lost, although in the case of certain CESBs the figure neared 50 per cent. This is all the more serious because certain cities, such as Recife and São Paulo, are faced with water shortages. In the city of Recife, losses for the Pernambuco state-company, COMPESA, reached 55.7 per cent. In São Paulo, the loss rate for SABESP was 34.5 per cent.

New opportunities in water management: Regulation and conflict-solution

Management of Brazil's water and sanitation services has been undergoing a crisis in its regulatory system for ten years. Under the previous system, conditional allocations of funding were made to CESBs by the Banco Nacional da Habitação (BNH, National Housing Bank), the centralizing agency that established standards and distributed financial resources. With the closing of the BNH, the regulatory system collapsed. There are as yet no regulatory practices that do not rely on funding allocation as a means of persuasion or dissuasion.

The financial resources at the disposal of the Ministry of Cities are currently distributed to CESBs and to municipal services according to the following criteria: the debt capacity of the those responsible for services (CESBs or municipalities); the need to resume stalled works; the (mandatory) existence of a formalized management structure, in particular a valid service concession or management-delegation contract; a payment policy (through tariffs or taxes); open lines of communication between the CESB and the municipality; citizen oversight of management services; and a guarantee on the part of the borrower to improve performance. However, certain companies do not respect these criteria and nonetheless receive funding from the Ministry.

Indeed, passage of the new water and sanitation bill is needed in order for new regulatory structures to be put in place. The bill recommends the creation of a national sanitation system (Sistema Nacional de Saneamento Ambiental, SISNASA) that states and municipalities would be members of on a voluntary basis. Those that joined would be required to comply with fixed standards. Membership would be a prerequisite for access to federal government funding. Membership would further require the states and municipalities to embrace measures included in the national system, such as the creation of a water and sanitation plan; the development of strategies to increase community involvement and to establish user oversight of management; the adoption of the standards put in place for the review of tariffs, and the adoption of the criteria recommended for the water-management delegation.

Certain conflicts might be resolved through these new structures. First of all, various institutional conflicts might be settled because the proposed bill more specifically defines the roles of the public and private sectors in the management of services. This is very important, as the relationship between CESBs and municipalities will be subjected to a new normative framework that gives much greater power to the municipalities. Following passage of the bill, a system of management sharing would become conceivable, made possible by the clear definition of the functions of the different institutions involved in services management: the national government, the states and their CESBs, and the municipalities. The bill first of all recognizes municipal authority over services. With regard to urban areas, it states that municipal services must follow the norms and legislation established by the states, although this would not affect municipal jurisdiction over services management. The law recognizes that the states, in the interest of harmonizing services, may enact laws governing the form of service delivery taken by municipalities. However, the states would not be able to supersede municipal authority over water and sanitation services, especially as regards the setting of tariffs and the oversight of contract compliance.

A new structure of services management thereby becomes possible, one in which states would retain an essential role in the production of drinking water (catchment and treatment) and in regulating the use of the water supply in the catchment areas of their territories. The states would also play a supplementary role if municipalities proved incapable of managing their water and sanitation distribution systems. Municipalities that choose to do so would take control of their water and sanitation services, with two new options available to them: they could install decentralized water treatment systems and they could develop intermunicipal cooperation, in accordance with the new law on intermunicipal associations (*consorcios*). The municipalities would therefore be able to choose between managing services through either a direct or an autonomous management structure (managing through a public department or municipal corporation), managing services in association with other municipalities, or delegating management either to public companies such as the CESBs or to private companies. According to the bill, municipal delegation to the CESBs would not require a call for tenders when the delegation is part of a programme contract.

To overcome conflicts surrounding modes of financing, cross-subsidization should be understood to include the different uses of water and not only those uses limited to the supply of urban areas. The Brazilian model of water resources management is based on

an integrated vision of the different uses of water at the watershed level, which makes it possible to imagine cross-subsidization among different uses. Until now this kind of cross-subsidization has only been applied in the metropolitan area of São Paulo: in the development of the Alto Tietê Basin Plan several measures have been combined to control urban river flooding and to restore the water quality of catchment areas.¹¹ These projects, which already have financing, could be linked to specific projects designed to connect areas not being served by a water and sanitation system. Made worse by urban flooding, the effects of non-point source pollution on the quality of water used for urban provision have really only recently been taken into account. However, in cases where water catchments are shallow, such as in the São Paulo metropolitan area, the combined effects of flooding and pollution warrant attention. The potential for corrective measures opens an opportunity for creating new forms of cross-subsidization between different sectors.

What makes the implementation of these measures difficult is the excessive division of responsibility for water and sanitation services, as well as the absence of institutional integration of services management and water resources management. At least conceptually, thanks to several general directives, Brazil has moved from the notion of *saneamento básico* (water, wastewater sanitation, solid waste) to that of *saneamento ambiental* (water, wastewater and rainwater sanitation, solid waste). Still, the management structures of these services are not integrated at the operational level. The supply-side logic of rainwater sanitation services is not compatible with that of water provision and wastewater sanitation services, whose tariffs are determined case by case. Nor is the logic governing water provision and wastewater sanitation services compatible with the operational logic of waste services. A solution may perhaps be found that could somehow integrate the daily management of these services, but they are guided by very different investment and amortization strategies. However, a further weakness of integrated water resources management derives from the fact that the policies and programmes of *saneamento ambiental* are not based on objectives common to the policies and the plans put in place at the watershed level. This is true both of large national projects and the policies put in place at the state and municipal level. As a consequence, an enlarged planning strategy conducted with multi-level coordination becomes necessary.

The law proposed by the Ministry of Cities represents a first step towards the construction of integrated project management. The law defines four levels of planning (the national, state and municipal levels as well as, possibly, an intermediate level of conurbations). At each level a plan must be developed identifying the services included in *saneamento ambiental* (water, wastewater and rainwater sanitation). The plans must be compatible with the basin plans and, in the case of a municipal-level plan, with the master urban development planning of the municipality. This new opportunity for integration will necessarily call into question state and municipal jurisdiction while benefiting new territorial authorities, such as city administrations and basin committees.

¹¹ For example, by controlling rainwater discharge at points far upstream from the hydrologic network of the city of São Paulo.

However, even with the new, multi-level, territorial approaches to planning and cross-subsidization, the framework of public funds dedicated to water and sanitation must also be re-examined. An increase in investments in the sector should be foreseen, with the understanding that public funds fall within the framework of public health investments and, for this reason, ought to be exempt from the austerity measures linked to the reduction of public debt.

In the final analysis, direct disputes with users are not seen in great number in Brazil. Dispute resolution generally depends on settling institutional conflicts and on the implementation of public financing mechanisms capable of guaranteeing lasting and equitable services. These policies will not, however, protect users from conflicts, for despite some advances in certain municipalities, the management of public services remains firmly closed to consumers. A bill introduced by the Ministry of Cities proposes a new structure of public participation and oversight of services: the City Council, through which participation in and oversight of water and sanitation services management will be possible. Among their functions, City Councils will develop, then advise on, the strategies and priorities of the Municipal Water and Sanitation Policy. They will also follow and evaluate the Municipal Water and Sanitation Plan, indicate priority investments, define cross-subsidization and social aid, and advise on other matters such as tariffs or services delegation. In addition, they will have to coordinate with other City Councils according to their sector, and in close relationship with water and sanitation management bodies such as the Health Council and the Environmental Council. The City Councils will participate in the State Cities Council and in the National Cities Council. The Council will also have to evaluate and approve the annual report on the quality of services.

Conclusion

The Ministry of Cities bill on water and sanitation may be considered a step forward for the institutional organization of the sector and for public participation in services management. It puts in place a general political directive promoting public involvement. Combined with other, existing social-oversight mechanisms, such as the Participatory Budget, the City Councils may be new places in which to construct more equitable management of water and sanitation. According to the law, the Councils will not only be advisory authorities, but decision-making authorities with regard to municipal policies.

But are these advances in social oversight desired by the Workers' Party, and – as they lie at the core of the Ministry's bill – are the advances compatible with the liberalization of Brazil's economy? The Lula government has signed off on another law which regulates public-private partnerships (PPPs) and includes water-sanitation services among the sectors concerned. According to certain officials associated with the federal government, the Water and Sanitation bill is solid enough to guarantee that the poor will have access to services even in the case of privatization. Indeed, the bill contains several innovative features along these lines. First, it ensures that all users connected to a system will have access to a minimum volume of water, including those users with outstanding charges. Second, the bill provides certain guarantees to users: the right to a handbook containing information about services provision and the quality of the water distributed, and mandatory notice of any service interruption resulting from technical problems with the system. Finally, it must be emphasized that this bill establishes a policy of financial

assistance for users who cannot pay the total cost of services, a policy that is essential to guaranteeing the inclusion of the poor in the benefits offered to the rest of society. A single law does not, however, suffice to ensure access to services. The application of the law will have to be watched closely; its success will depend both on the political will of municipal leaders and on the strength of the demands made by the politically-organized lower classes.

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Urban Water Conflicts in Buenos Aires, Argentina: Voices questioning the economic, social and environmental sustainability of the water and sewerage concession

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Introduction

In a city that lies along the banks of the Río de la Plata, an inexhaustible source of freshwater, and also sits on the largest reserve of groundwater in the world, large numbers of the inhabitants of the Buenos Aires metropolitan region do not have access to a supply of quality water. Some of the city's inhabitants, mainly in the southern part of the concession, are suffering serious environmental externalities. This observation merits research into the conditions under which the resource is managed and distributed.

Under pressure from international organizations, Carlos Menem's *'justicialist'* government launched a series of wide-ranging reforms at the beginning of the 1990s³, enabling the International Monetary Fund (IMF) and the World Bank (WB) to carry out and assess the results of 'on-site' tests of the neo-liberal policies that they had advocated.⁴ An

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³ These include the introduction of Argentine peso/US dollar parity and privatization of all key sectors of the economy, which led Argentina to permanently break with an approach to industrial development based on a centralized state in favor of a complete opening up of the Argentine economy to foreign investment.

⁴ This, without regard for the constant and significant deterioration in the principal social welfare indicators (unemployment, poverty, healthcare, education, etc.) and the increasing burden of external debt (which had

analysis of the various developments in the Aguas Argentinas S.A. (AASA) concession agreement makes it possible to retrace the gradual whittling away of the neo-liberal economic model that had been based on the idea that private operators, under public authority control, would be able to inject large financial investments into the water sector, enabling the public operator to make up for lost time by maintaining and expanding the water network. Such investment was to be recuperated via a suitably adapted pricing mechanism, accompanied by effective commercial management. The ultimate objective of the agreement was a full quality service (serving 100 per cent of all users) in the largest concession area in the world. The AASA's concession agreement and regulatory framework stipulated a certain number of action principles as the basis for organizing the concession. In this study, we will seek to analyse how these action principles may be perceived as incorporating the seeds of urban water conflicts and how they gradually changed with the development of the conflicts, in order to draw conclusions with respect to the dynamics at work in this concession area.⁵

The social urban context

The city of Buenos Aires, capital of Argentina, is both a modern Latin American city that has benefited from particularly strong industrial development during the second half of the twentieth century and a highly fragmented territory, in social and economic terms. As a result, the city and its peri-urban ring are marked by strong contrasts: from the shantytown area of *Villa de Emergencia 31*, behind the train station (itself peopled by executives travelling to and from their businesses) to the extreme precariousness and almost unimaginably (for the *porteño*⁶) deteriorated and unsanitary conditions of those neighbourhoods on the outskirts of the city. Poverty in Buenos Aires has another face to show. After the crisis undergone by the country over the past few years, pauperization of the middle classes has been added to the existing structural poverty (NBI, *Necesidades Básicas Insatisfechas*, unsatisfied basic demands) of the outskirts and the ring neighbourhoods of the federal district (Prévoit-Schapira, 2002). According to data collected by AASA, there are 593 poor neighbourhoods (home to 2.5 million inhabitants) in the concession area, of which 445 (1.1 million inhabitants) are within the area served by the system. For the sake of clarity, let us recall that of the 12 million inhabitants living in the city of Buenos Aires in October 2002, 54.3 per cent were living below the poverty line – that is, on less than 700 pesos (US \$240) per person per month.⁷ This is 21.2 per

rapidly become the major item of public expenditure). The image of Argentina as one of the international financial organizations' 'star pupils' resulted in even more surprise on the part of the international community when faced with the extent of the social catastrophe triggered by the crisis of December 2001.

⁵ For the purposes of this paper, we define urban conflict by considering the city, or 'the urban', as an ensemble of products (material products and services) dedicated to the satisfaction of collective or individual needs. In that sense, the city is a public object which is a concern of private interests and, as such, constitutes an object of social dispute. This social dispute materializes particularly in a process of social integration/exclusion that produces territorial segregation through the configuration of socially homogeneous spaces within heterogeneous cities (Pirez, 1994).

The urban conflicts we study in this paper are 'open' conflicts. According to Albert Hirschman's grid, they would be analyzed as 'voices' (neither 'exit' nor 'loyalty'). For further details, see Hirschman, 1970.

⁶ A *Porteño* is an inhabitant of Buenos Aires.

⁷ Data provided by INDEC (Instituto Nacional de Estadísticas y Censos), 27 December, 2002.

cent of the population of the federal district and 64 per cent of the population of the outskirts.

Water services before privatization

In Argentina, the state-owned water and sewerage company, Obras Sanitarias de la Nación (OSN), aimed from its inception in 1912 to present itself as a ‘model’ public utility, by virtue of its triple ambition: public hygiene, income redistribution and land organization (De Gouvello, 2001). Its water tariffs were highly representative of this ambition: the Río de la Plata allowed the provision of water to the entire city of Buenos Aires in large quantities (the aim of OSN was to provide 700 litres per day per inhabitant, the highest volume in the world). The issues of supply and rational utilization of the resource were therefore not of primary concern, nor was the issue of cost recovery, because the infrastructure rationale predominated over that of efficient service provision. The tariff was defined not as a function of the quantity of water consumed – as the system provided for *canilla libre* (all you can use) – but as a function of a calculation of indexes. This was a platform similar to that of a tax system based on the rental value of a dwelling (surface area of the land, constructed area, type of and age of construction, zone coefficient, etc.) so as to allow for more ‘equitable’ income distribution. However, this universal-access project encountered a major hurdle. On the one hand, the lowest-income groups were scattered in an eccentric manner, which meant the expansion was integrating a greater and greater population that was contributing less and less to paying for the service. On the other hand, the public utility, because of the heavy structural financial losses of the system, very quickly stopped investing in infrastructure, leaving the peripheral areas of the federal district waiting for connection to the network (see Table 1 below). The ‘OSN model’ was not in a position to finalize the project because of its unbounded ambition. This ultimately led to the opposite result: a good service in the federal district and the fringe peripheral areas, with others waiting for connections that the state-owned company was not in a position to provide. Moreover, even in the areas not covered by the network, water was considered an ‘OSN question’: users, political actors, mayors and local administrators were simply excluded from having any voice in the system (Schneier, 2005).

Table 1: Water and sewerage coverage before privatization

	Water	Sewerage
Federal district (city of Buenos Aires)	99%	99%
Outskirts	55%	36%
Concession total	70%	58%
Number of connections (millions)	1.2	0.7

Source: AASA concession contract, 1993.

The private sector operating the largest water concession in the world

In 1993, after the Dublin conference stated that water was an ‘economic and social good’, a number of privatizations of state-owned water and sewerage companies took place throughout the world. In this context, the Argentine government launched a call for tenders for the Buenos Aires concession in order to continue and improve the activities of OSN, which was losing money and was in need of hefty investment for its seriously deteriorated infrastructure. The Suez group was awarded the contract. The concession contract, based upon the ‘universal service’ notion (Arza, 2002), stipulated a period of 30 years by which almost all of the population of the concession (comprising the federal district and the greater Buenos Aires area) had to be connected to both water and sewerage services, whenever the urban configuration so allowed.

Every five years, the company provides the regulatory agency (ETOSS, Ente Tripartito de Obras y Servicios Sanitarios) with a plan encompassing all of the expansion works to be carried out over the next five years, as well as the corresponding tariff adjustments. The five-year plan must be accepted by ETOSS, and represents a firm commitment from the company, which will be fined by the regulatory agency in case of non-compliance. The technical and commercial elements at stake for AASA are to be found in the expansion goals, most of which target the poorest neighbourhoods and those located farthest from the concession (mainly precarious neighbourhoods). The expansion goal at the time of the takeover (1993) was to integrate 3.5 million customers, of whom 65 per cent lived in poor neighbourhoods.⁸ The challenge was, and still is, enormous (see Table 2 below).

Table 2: Population connected and to be connected to water and sanitation services per type of neighbourhood (1993)

(1993)	Population connected (million inhabitants)		Population to be connected (million inhabitants)		Total
	Water	Sewerage	Water	Sewerage	
Standard neighbourhoods	5.6	4.7	1.4	2.3	7
Poor neighbourhoods	0.4	0.2	2.1	2.3	2.5
Total	6	4.9	3.5	4.6	9.5

Source: AASA data, 1998.

⁸ AASA data

Technical access to the network: The technical approach outlined in the contract was simple: a surface system with water coming from the Río de la Plata. Despite the existence of good-quality water tables in most areas, programme organizers did not originally foresee that poor neighbourhoods might drill wells to gain access to water. However, the idea of a single supply technique has been reviewed in certain recent projects.⁹ The contract specifies that all households are to be connected to the system once the expansion works are finished. The sole type of connection foreseen is for individual households; there is no mention of public taps. Except for the possibility of obtaining water from a well (permitted until the company's works reach an area), AASA did not envision alternative linkages to the public water system.

Economic access to the service: The cross-subsidy tariff system that existed when the company was state-owned was still valid at the time of writing. It is used on the one hand to finance the operation (as a redistribution tariff) and on the other hand (since 1997) for financing network expansion.

Development of the paper

We analyse water conflicts in terms of 'urban sustainability', using an heuristic grid composed of three main axes: economic, social and environmental issues that lead or have led to urban water conflicts in metropolitan Buenos Aires.

Economic sustainability issues leading to user and political conflicts

We will study the conflicts linked to the economic sustainability of the concession on the basis of two emblematic examples: firstly, user conflicts that result from the financing scheme for the expansion of the network and, thus, are related to territorial solidarity issues at stake within the concession; and secondly, conflicts due to the devaluation of the Argentinean peso (in January 2002), which could be called 'political conflicts', dealing with financial balances and monetary risks in the concession contract.

Financing the expansion of the network: The SUMA conflict

According to the 'consumer-payer' approach adopted in the concession agreement, the initial extensions to the network mainly concerned profitable economic areas (particularly in the north of the concession area) that were in a position to pay for the major costs involved in developing the infrastructures. This triggered several splintering phenomena, mainly between the inhabitants of the capital, who were already being served and who benefited from a higher quality service (through the repair and maintenance of the water

⁹ See the Agua + Trabajo (Water + Work) programme in the municipality of La Matanza in 2004. It includes the construction of local systems that use water from the water tables (via wells), which themselves should be connected to the primary network within a few years (once the expansion work is complete). This programme, which was begun at the direct request of the Argentine president in 2003, aims to connect 178 poorer neighbourhoods in the La Matanza municipality to a water supply (on the second outlying ring of Buenos Aires). It envisions the participation of neighbourhood co-operatives, and benefits from a fund of more than 35 million pesos (around \$US 13 million). It is an ambitious project that should eventually connect more than 400,000 people.

system and treatment plants) at no extra cost, and the residents of peripheral zones who had to bear the enormous cost of expanding the network (to secondary and domestic networks).

This situation led to two kinds of user conflict:

- The first one was **concerted demonstrations by non-connected people** who were not able to pay the fee for the new connection. This led to the reform of the expansion financing scheme
- The second one was **organized protests by already-connected people** not wanting to have their bill raised as a consequence of the new financing system.

The AASA concession agreement initially stated that the network expansion would be financed only by newly connected users (via an 'Infrastructure and Connection' charge). The charge ranged from 400 to 600 pesos for water and 1,000 pesos for sanitation (at the time, the peso was equal to the US dollar). Most low-income customers could not afford this charge and, therefore, were not able to pay their bill. Moreover, some of them began what they called a 'bill strike' (with 80,000 bills unpaid in 1996).

The first neighbourhood protests began in 1995 in the western part of the concession (La Matanza, Lomas de Zamora) when local residents realized that the connection fee (CIC) was more expensive than the OPCT rates (contract work by third parties). Neighbourhood associations began to organize actions so as to prevent AASA from working on the network expansion in their area: a human barrier of 300 people stopped engineering work on a project, negotiation processes began with lawyers to challenge a specific project and its financing, formal complaints were made to the regulatory agency, street demonstrations and sits-in in front of the AASA local headquarters were organized, denunciations were made on television, etc. (Schneier, 2005).

Following blatant economic distortions and concerted action by those excluded from the network and unable to pay, the methods of financing the concession were renegotiated in 1997 at the company's request. Since then, network expansion has been financed via the participation of all network users, based on two new concepts: a service incorporation charge (CIS), which replaced the CIC, and a new 'universal service and environment tax' (SUMA).¹⁰ The result was a slight rate increase for users who were already connected and a significant fall in the cost of connection for new users (see Table 3).¹¹

¹⁰ The SUMA comprised two aspects: SU for universal service and MA (medio ambiente) for environment.

¹¹ Calculations by pro- and anti-privatization analysts highlight the same trends.

Table 3: Average costs per bimonthly bill before/after the renegotiation of 1997

		Before	After
Average cost for users already connected	Water and sanitation services	30.00	30.00
	Regulatory charges	0.80	0.80
	SUMA Tax	-	6.00
	VAT	5.46	7.72
	Total	37.26	44.52
Average costs for new users (water only)	Water and sanitation services	6.00	6.00
	Regulatory charges	0.16	0.16
	SUMA tax	-	3.00
	CIS charge	-	4.00
	Infrastructure Charge	44.00	-
	VAT	10.53	2.76
	Total	60.69	15.92

Source: Alcaza, et al, 2002, data from La Nación, 24/02/98.

In spite of a strategy focused on renewed solidarity at the territorial level, the creation of the SUMA was the cause of numerous highly publicized debates among local political representatives, as well as numerous legal actions. Actually, the concept of SUMA altered the splintering capital/periphery effect for many users, as it challenged the ‘new consumer as payer principle’, which was one of the basic precepts of the international financial institutions (full cost recovery). The introduction of the concept of SUMA was, however, denounced by the Counsel for the Argentine people (*el Ombudsman*), due to its SU – universal service – component. This declaration halted all expansion work in progress for over a year pending resolution of the problem. The municipalities concerned by the stoppage considered that this declaration was made to defend the special interests of the City of Buenos Aires itself (due to the considerable increase in water charges involved for users already receiving the service), and they banded together to take legal action against this intervention. This concerted action also provided the opportunity to set up a forum composed of all of the municipalities of Greater Buenos Aires to initiate a debate in respect of all themes related to water and sanitation services. Thus, setting up an institutionalized forum consisting of the municipalities of Greater Buenos Aires, via the intermediation of the Ministry of Public Works for the Province of Buenos Aires, constituted an essential step in the shift of power from the national sphere to a local level. As such, we should bear in mind that the concession agreement had been signed between the Argentine State (grantor of concession) and AASA (concession holder). Although the local public authorities were directly concerned by decisions relating to the management of water services, they were not involved in such decisions due to the decision-making structure on which the concession agreement was based.

Devaluation of the Argentinean peso: The beginning of the concession contract renegotiation

The neo-liberal model rested on the convertibility between the Argentinean peso and the US dollar. The crisis of December 2001 and numerous social movements led to the fall of the government and a global dynamic of total rejection of the on-going economic model. The peso-dollar parity, which could not be supported any further by the national economy, was rapidly abandoned. In January 2002, the temporary government announced the devaluation of the national currency, and instituted the *pesification* (conversion to peso) of public services' tariffs (the tariffs stipulated in the concession contracts had been defined in US dollars) and, thus, put an end to the concession contract terms. The end of the monetary model based on convertibility had a huge impact on the operators' economic and financial balances. Since then, a renegotiation of the concession contract for all public utilities has been underway.

According to the new law, the renegotiation of the contracts had to take into account 'the impact of the tariffs on the competitiveness of the national economy, on income distribution, on the level of service quality, on investment plans – as soon as they were contractually defined – on users' interests, on the accessibility to services, on the technical systems security, and on the operators' profitability'.

The purpose of the law was to confirm the clear will of the public authorities to secure global contract revisions that would reconsider 'not only the interests of the private companies but also the level of completion of the contracts and, above all, the population's capacity to pay for the services, because the majority had experienced a marked fall in their income level' (Twhaites and Lopez, 2003). Article 10 prevents companies from 'stopping or altering the completion of their obligations', while Article 13 authorizes the government to 'regulate in a temporary way the incomes and prices of the goods and services considered as 'critical' so as to protect the users' and consumers' rights from any hypothetical distortion of the markets or actions of a monopolistic or oligopolistic nature'.

In many aspects, this law constitutes a complete reversal in service management policy, due to a new economic context, that is much less favourable to the companies.¹² Beyond the water sector, the context that led to these renegotiations also had serious repercussions on the Argentinean political and economic scene. It opened the way to urban water conflicts of a new kind: to confrontation between the government and water companies (and companies in other sectors). This included pressure for and against the increase of public service tariffs, companies resorting to the international courts to denounce the 'pesification' of the contracts, 'crisis' events in the services (electrical cut-offs, etc.), and to certain international companies deciding to leave the country.¹³ The

¹² The majority of the services contracts were based on the US dollar reference. These contractual definitions were very profitable to the operators and had led to sizeable external debts for the expansion investments (in US dollars). In a context where the peso was worth a dollar, the exterior debts were largely covered by local incomes but once 'pesification' was instituted, external debts began to be a real burden for the companies that could not compensate them with incomes converted to peso (divided by three on average) and in a recessive global context.

¹³ Legal cases were made to the ICSID (the World Bank's International Centre for Settlement of Investment Disputes) in the framework of the bilateral treaties for the promotion and the protection of

first analyses of this total reversal of the situation were very critical of the private companies (Aspiazu, 2003) and explicitly denounced the unfair balance of forces acting in the negotiation (in favour of the companies); nevertheless, they admitted the importance of the economic and social elements at stake in the negotiation.

In actual fact, the Argentine economic crisis of December 2001, which had been in the making since the mid-1990s, clearly highlighted the limits of this doctrine; however, the impacts within the Buenos Aires Metropolitan Region (BAMR) were of a contrasting nature. The crisis demonstrated that the southern areas are subject to global economic and financial circumstances that are largely beyond their control. The Enron crisis, which triggered the hasty departure of Azurix, plunged an entire zone within the southern agglomeration into uncertainty regarding the future of its water service. On the other hand, in the absence of any proof to the contrary, the Suez Group appears to have stood by its 'showcase' concession in spite of the economic crisis, at least until September 2005.

Social sustainability issues: Bringing water service to the poor

We will now look at the question of the social sustainability of the concession through the examples of two measures that were adopted and applied to face the collective claims of poor people in Buenos Aires' suburban zones: firstly, the 'participative management models' as an answer to the claims of poor neighbourhoods' inhabitants to connect to the drinking water network (technical access); secondly, the 'social tariff' as an answer to poor users who were no longer able to pay their water bills in the new recessive context (economic access).

Bringing water and sewerage networks to poor neighbourhoods

In her work, Cristina Cravino analyzes in detail the different modes of mobilization of poor people in the Buenos Aires peri-urban neighbourhoods (especially in the *asentamientos* at the beginning of the 1980s) wanting to obtain land property titles. Cravino insists on the importance of the claim to public services (water, electricity, telephone) to this dynamic (Cravino, 2001). The recognition of property and the access to public services are presented as two processes that echo one another. At the beginning of the 1990s, the privatization of public services profoundly transformed the nature of the water operator's answer to these sorts of claims. Since then, the population no longer addresses its claim for connection to water services to the public authorities directly, but to a private company operating through a concession contract whose terms are not clear regarding this specific question.

The contract actually excludes the slum areas (as it only prescribes that networks are to be expanded to urbanized areas), as well as the internal networks of the *barrios armados*, which are large groups of dwellings under the responsibility of the municipalities. This

foreign investments signed with Argentina. This 'offensive' on the part of the companies was rapidly answered by the Argentine public authorities: the ministry of economy emitted a decree (No. 308/02) to exclude the companies that had been to court from the renegotiation framework. France Telecom sold its participation in Telecom Argentina in September 2003; EDF reduced its participation in Edenor to 25 per cent in September 2005; Suez announced its intention to disengage its participation in AASA in September 2005.

means there is no contractual obligation whatsoever to provide services to these two types of neighbourhoods – which, in terms of population, represent more than 25 per cent of the poor neighbourhoods inside AASA’s concession area.¹⁴

In response to the conflict: the establishment of an access to services programme carried out by the Community Development Unit¹⁵

To face the challenge of providing water services to poorer neighbourhoods in the concession area, the concession company moved quickly to approach the problem of urban poverty. However, the group that won the concession contract (Suez-Lyonnaise des Eaux, later Suez-Environnement), which initially favoured sustainable development programmes, became less enthusiastic later on as it became more aware of the investment dynamics in developing nations such as Argentina.

Table 4: Population connected and to be connected to water and sanitation services per type of neighbourhood (1998)

(1998)	Population connected (million inhabitants)		Population to be connected (million inhabitants)		Total
	Water	Sewerage	Water	Sewerage	
Standard neighbourhoods	6.8	5.5	0.2	1.5	7
Poor neighbourhoods	0.8	0.3	1.7	2.2	2.5
Total	7.6	5.8	1.9	3.7	9.5

Source: AASA data, 1998.

Responding to the regulator’s demand, the Community Development Unit (CDU) was created in 1999 within AASA. The original goal was to define and implement a **social back-up methodology** for network expansion in poorer parts of the concession.¹⁶ Little by little, the scope of these activities and responsibilities was enlarged until it encompassed, among other things, the regularization of services in the poor neighbourhoods and the professional training of company staff on issues linked to company activities, such as sustainable development, direct communication, management

¹⁴ Of the total population of the concession area’s poor neighbourhoods (more than 2 million people), around 15 per cent live in slums, 10 per cent in *barrios armados* and 75 per cent in precarious neighbourhoods (data from the IIED-LA-UADE report: Participation of the private sector in drinking water and sewerage in Buenos Aires, balancing the economic, environmental and social goals, July 1999).

¹⁵ Now called the Sustainable Development Unit.

¹⁶ The vast majority of the poorer areas that the operator was concerned about in terms of service expansion were the precarious neighbourhoods, as the slums and the peripheral cities are not included in the operator’s contractual obligations.

of community meetings, management of conflicts, participatory management of the projects, etc.¹⁷ Since the beginning of 2002, the goal of the CDU has been to define the concessionaire's policy for low-income neighbourhoods by having the communities understand the value of the public/private participation model. With this in mind, it defined a series of almost forty projects called Participatory Management Models (MPG), the purpose of which was to achieve full-scale expansion or regularization of services in a particular neighbourhood. MPGs are built on a three-party agreement, institutionalized by a contract between the company, the 'neighbourhood community' in question and the municipality.¹⁸ This must then be agreed upon by the regulatory agency, whose role is to supervise the process and authorize the consolidation of the partnership among all of its stakeholders.

Box 1: Participatory management models (CDU-AASA)

The criteria to be fulfilled by MPGs are valid for all participants:

The neighbourhood community must request the service (following the concept of 'informed request' established by the company). The project will be carried out only if 80 per cent or more of the neighbourhood agrees. The community must be able to organize itself and choose its representatives, and must also provide the manpower for the infrastructure work.

The municipality commits itself contractually to fulfilling its responsibilities as regards the infrastructure work (digging ditches in the streets, etc.), distributing the necessary tools (gloves and shovels) and organizing the distribution of funds – the *planes jefes y jefas de hogar* (heads of household programmes). These are subsidies of 150 pesos per month, allocated by the government to the heads of households participating in a community labour programme.¹⁹

The company is in charge of the technical feasibility of the project. It must provide the necessary materials (pipes, wrenches, and so on) and technical training (workshops for people to become familiar with techniques and safety issues) as well as being responsible for communication with the community (workshops introducing commercial aspects and providing answers to questions or doubts from inhabitants).

Main results of the programme

The installation of participative management models (MPGs) in 2002 marked the beginning of the company's operational stage. This was together with a continuous growth in the number and dimensions of operational projects. Twelve MPG projects were carried out in 2003, allowing 8,000 people to be connected. In 2004, there were 21

¹⁷ In the water sector, the term regularization concerns the establishment of a standard technical and commercial relationship with certain neighbourhoods. It can take very different forms. For example, regularization can mean organizing the expansion of water services to a neighbourhood that is not connected but is located inside an area served by the concession, or it may mean taking a closer look at the unpaid bills of certain customers in order to organize workshops focusing on commercial issues. The scope of CDU was enlarged to include all of the poor neighbourhoods in the operational projects and not just the precarious neighbourhoods, as was initially the case

¹⁸ The neighbourhood community, according to the term used by AASA, comprises all of the inhabitants of the neighbourhood. This community appoints its representatives, elected or not, to sign the contract.

¹⁹ In 2002, 150 pesos was the equivalent of \$US 50. In addition to these payments, inhabitants who participate in the works benefit from a reduction in their water bill for a number of years.

projects involving the connection of 30,000 people, and projections for 2005 foresee the connection of more than 400,000 people, thanks in particular to the implementation of the Water+Work programme. Moreover, in January 2004 a specific resolution was passed by the regulatory agency regarding a reduced water service tariff for poorer neighbourhoods: it stipulates a bimonthly (reduced) invoice of between 4 and 6.5 pesos (i.e. between \$US 1.5 and \$US 2.4) per service.

The profitability evaluation of the service extension projects to the poor neighbourhoods is still incomplete. However, a degree of improvement has been seen in the bill collection rate after commercial efforts such as workshops. Likewise, payment ratios are very good (much better than those in traditional neighbourhoods) when the community participates directly in management tasks, such as handing out invoices and getting together with neighbours to pay bills. It is worth noting that water supply costs to poor neighbourhoods before connection to the urban network were much higher. The benefits gained by Argentine society from the programmes, in both sanitary and social terms, have been encouraging, with much better health indicators in connected neighbourhoods due to better access to drinking water. The programme has also meant an improvement in the dialogue between the neighbourhood communities, the municipality, the regulatory agency and the operator, and improved community organization.

Box 2: The paradoxical impact of the Argentine crisis on the programme

Paradoxically, the December 2001 crisis did not slow the development of neighbourhood projects in poorer areas. On the contrary, 2001 became an actual springboard for the operational stage of the participative management models. Moreover, these projects were the only opportunity for AASA to proceed with the extension of the networks, as all the remaining projects negotiated for the five-year plan were stopped temporarily. This strange situation was the result of a number of effects combined: the maturity effect (the crisis arrived right when the company was ready to establish projects for the poor neighbourhoods); the cost impact (expansion in poor neighbourhoods is generally less expensive than in traditional ones) and, finally, the image effect (during the contract renegotiation period, the poorer neighbourhoods' projects represented the *cara humana* (human face) of AASA's activities).

The social tariff: The response of the Argentine middle class

After the crisis in December 2001, the majority of the middle class fell into poverty. Many people who had been connected to the water and sewerage networks suddenly faced a situation where they were no longer able to pay their water bill. In a highly ideologized context, many users organized direct demonstrations (*escraches*) in front of the private companies' offices to denounce potential price increases (after the peso devaluation).

Unlike what might be expected, the social tariff programme was not aimed at the poorest population in the concession. Because it proposed a reduction of the water bill (according to economic and social criteria), it necessarily was addressed to those *already connected* to services, mainly the impoverished middle class. This measure appears to be emblematic of the ‘new poverty’ phenomenon that appeared in the 1990s after the structural adjustment policy of the Menem government. To face new social tensions resulting from a degradation of purchasing power, the company and the public regulator decided to institute a social tariff programme for water and sewerage services (see Box 3).

Box 3: The social tariff programme (STP)

The social tariff programme (STP) emerging from the company’s demand. It was formalized by the public regulator (ETOSS) in collaboration with the user commission it integrates, the Water Company and NGOs working in the field. Since its first application, the regulatory technical team has managed the programme. The STP was introduced as part of the tariff revision act (authorized by the ETOSS resolution 2/02, January 2002). It includes a system of economic assistance to low-income users, to be ‘efficient, transparent, explicit and focalized’. It is not a cross subsidy. The economic assistance is organized through ‘reduction modules’ on the bill (4 pesos by service and by bill). According to their situation, households can benefit from one or two reduction modules.

The criteria to be eligible for the programme are as follows: to live beneath the poverty line, to be registered as a regular client, and to have bills that are less than 30 pesos (since 2002). The user must initiate the request. The municipality selects the STP beneficiaries from the applicants and then sends a list to the company, which applies the reduction modules directly to the bills. The company has to reserve a 4 million pesos of its annual budget for the STP.

The evolution of the environmental question in the context of the water sector privatization and concession process

The first agreement for the concession of drinking water services, signed in 1993, did not include any clause for environmental protection by virtue of its preponderantly economic approach and the absence of unified legislation on water resource management.

With the 1994 constitutional reform, a new range of opportunities opened up for the unification of environmental protection criteria.²⁰ This situation – in which provincial legislation appears to be underdeveloped and out of date as it goes through a process of structural reforms aiming at privatization and market liberalization – has an impact at the federal level, as provincial jurisdictions have to process strong conflicts of interest among sectors requesting resource management without being accountable for providing adequate protection.

²⁰ The 1994 Constitution produced a series of innovations regarding environmental protection. One of the most important consisted in requiring water operators to produce Environmental Impact Studies for investment projects.

In the Buenos Aires Metropolitan Area, one of the main conflicts of interest results from the rise of water table levels. This process emerged at the end of the 1990s, though a considerable part of the related definitions for its service management and supply had already been defined in the concession contract.

Two decisions contributed to the conditions for the conflict's emergence: firstly, the closure of the wells that extracted water from the underground aquifer and the switch to using surface water extracted from the Río de la Plata and, secondly, the definition of an investment plan for expansion of the system that assigned too much weight to the drinking water system, at the expense of the sanitation system.

Water table rise, flooding and environmental conflict

The rising of groundwater is a natural response that the hydrological system adopts in order to preserve equilibrium among its different variables. In the case of the Buenos Aires Metropolitan Area, many factors contributed to this process in the 1990s.²¹

According to the 1991 census, the supply deficit of the domestic water system was 55 per cent, whereas the sewerage deficit had reached 80 per cent. In the course of the past decade, the domestic water system had been rapidly extended in different municipalities within the suburban zone. Conversely, the sewerage network did not grow in proportion. This means that, in net terms, a greater volume of water was entering the region that, because of the low coverage of the sanitation systems, was dumped again in the same territory.

The balance between the different phenomena of natural and man-made origins varies in each of the sub-regions that were taken into consideration inside the Metropolitan Area. Researchers (Santa Cruz and Buzzo, 1999; INA, 2002, 2003) agree that the human factors – among them, the reduction in potable water extraction from aquifers – outweigh natural ones.

In any case, these factors together caused the groundwater to rise in seventeen districts of the suburban zone. In the following section we will concentrate on the Lomas de Zamora case, one of the districts with a higher level of demand from neighbourhoods and social organizations.

Urban water conflict and environmental conflict: The Lomas de Zamora Water Forum

The level of knowledge of and interest in water service externalities and their consequences on health, environment and the local economy play a central role in the environmental conflicts that have taken place in the area (Sabattini, 1997). The case

²¹ Five such factors are as follows: (1) an increase in the precipitation level; (2) watercourse tubing (this solution, which was adopted to avoid overflows produced by rain, prevents the watercourse from being the natural drainage source when there is an excess of water due to an increase in precipitation); (3) the increase in impervious surfaces caused by acceleration of the urbanization process; (4) the closing of groundwater extraction wells used for industry (due to the industrial shut down that took place during the recessive period from 1994 to 2001); (5) a change in the source of supply for human consumption (from underground to surface water).

under analysis refers to a neighbourhood organization that changed its agenda over the years. It had begun as an organization of people who were victims of flooding. From the mid-1980s to the early 1990s it achieved the construction of different sanitation works in the watercourse (where overflows had the greatest impact in times of flooding). Towards the mid-1990s, now operating under the title of 'Water for Everyone', the group joined in demands for the construction of a drinking water supply works and the improvement of service quality. In 1992, the federal government began work on the 'third reinforcement' – an underground river for the Lomas de Zamora potable water supply. Construction began under the management of the public company OSN and was eventually completed under the management of the privatized company, AASA, in 1997.

The first cases of home flooding caused by elevation of the groundwater table were recorded in early 2000. In that same year, another rain-caused flooding took place, affecting the lower zone of the district, in which water drainage was much less efficient than in previous episodes. In this context, a new organization emerged, the Hydric Forum, which began to petition the provincial and federal authorities and AASA, blaming them for elevating the water table by closing down the underground water extraction wells and replacing them with a superficial water supply. The conflict became acute between 2001 and 2003, when the organization gained public visibility through organizing protests, writing petitions to the authorities, taking the company to court and holding demonstrations in Plaza de Mayo. During that same period the organization articulated demands from other groups of victims living in other parts of the suburbs.

At present, the conflict is going through a process of mediation and, with the intervention of the federal government, a new funds contribution has been set up for the cleaning and sanitation of the watercourses, which continue to overflow due to a lack of maintenance. AASA, through an agreement with the Province of Buenos Aires Government, has purchased drainage pumps, to be allocated to the municipalities, to extract water from the water table and lower its piezometric level. An ongoing problem is that not all of the municipalities are able to maintain the pumps; in many localities, the pumps worked for a few months and then broke down.²²

The community association continues to demand sanitation works, because systems of domestic off-loading have overflowed in their neighbourhoods (settled on lowlands), creating serious risks for the health of the population.

'Environmental problem construction' and the need for a responsive institution

In this case, the environmental problem has been constructed through the aggregation of demands and changes in the groups' profile. Although the original demand was for drinking water, the water supply generated to meet this demand had unexpected consequences that harmed the environment.

²² This is an agreement that was signed between the Province of Buenos Aires and the company in January 2003 for the installation of 1,500 pumps in 17 municipalities of the greater Buenos Aires region. The agreement establishes that the concessionaire is responsible for the machinery and for two-thirds of the installation costs, with the government responsible for the remaining amount.

Scientific and technical knowledge play a significant role in defining the environmental problem, for when the group began complaining to AASA, they received answers that tended to limit the company's responsibility, putting the causality down to other problems not linked to the 'third reinforcing' project. It became very important for the organization to collect proof that, beyond their legitimate claims, would allow them to show clear attribution of causality and responsibility. The publishing of a report by the Instituto Nacional del Agua (INA, National Water Institute) gave the organization's claims a greater level of legitimacy.

The other important element in defining the environmental problem is the transition to a stage of greater mobilization (this has occurred since the federal government change at the end of 2003). Demands started to be redirected at the federal government when the group decided that the emerging political situation would facilitate obtaining answers at the federal level, thus generating pressure on the provincial government (which has legal authority over water management). An important factor in this decision was the impact that the massive demonstrations had on public opinion and media coverage.

The relationship between community organizations, the provincial government, the federal government, the regulatory agency (ETOSS) and the concessionaire company (AASA) has gone through a series of different phases. At the beginning there was a process of 'relative acceptance' of the AASA's role, due to its part in the expansion of the drinking water service. As the home flooding problem became more prominent, the organizations started to openly confront first ETOSS, then AASA, through legal actions and, finally, by appealing to the federal government. The most important element of the social apprenticeship that the organizations went through could possibly be learning to understand the water problem as a phenomenon that resulted from a multitude of causes, and assigning shared responsibilities for resource management to the company and the government.

Conclusion

The urban water conflicts in Buenos Aires, which deal with economic, social and environmental sustainability issues, reveal the extreme limitations of the concession contract and the complexity of the interactions between all of the actors concerned by urban water management: including connected users, people not yet connected, public authorities, regulatory bodies and private companies.

If the cases presented in this paper (which we refer to as 'open conflicts' because of their public nature: demonstrations, mobilizations, denunciations, court cases, media declarations, etc.) provide an interesting panorama – they nevertheless do not constitute the totality of existing conflicts, much less those to come. Solutions to these conflicts are not always sustainable or even identifiable.

The conflict cycles identified in the Buenos Aires cases – such as the user conflicts initiated by people not yet connected to the urban water supply (and wanting the firm to lower the connection fee), which were resolved through the creation of the SUMA fee, leading to a new conflict (initiated by people already connected to the water system) – illustrate the highly revealing nature of analysis that is based on *concrete* urban water management. Studying urban water conflicts is a very pertinent method of analysing large

water systems and their social implications. It can help us to understand the complexity of the social and political dynamics at stake, together with the issues involved in governing concessions that can arise through a lack of social solidarity – in this case within the specific territory of the Buenos Aires Metropolitan Region. From this perspective, the purpose of our paper was to identify *potential* fields for further analysis in relation to urban water management.

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Urban conflicts over water in Mexico: A theoretical and empirical exploration

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Introduction¹

The research on which this paper is based was triggered by our interest in understanding the meaning and causes of the large number of social confrontations over water recorded in the Basin of Mexico during the 1980s and 1990s. These are conflicts over water resources and services ranging from bureaucratic complaints to mass parades, acts of civil disobedience and even direct violence resulting in the destruction of infrastructure and the loss of human lives. The Mexican authorities recognized that by the early 1980s ‘the protests of the majority around water problems were amazing, owing both to their depth and breadth’ and that ‘water had become a strong political concern for society’ (SARH, 1988). It seems that water problems attracted even more attention after the urban catastrophes of the mid 1980s, in particular the 1985 earthquakes that seriously damaged the urban infrastructure and further worsened the living conditions in Mexico City.

Despite the political saliency of water conflicts in the Basin of Mexico, and in the country at large, the interrelation between these incidents and broader social and political processes like the struggles for the democratization of the political system or the enhancement and expansion of citizenship rights have received comparatively little attention. This work contributes to filling this gap by exploring the interconnections between the evolution of the processes and institutions involved in the governance and management of water resources and services and the development of citizenship in Mexico. The confrontations over water, we argue, are part and parcel of a wider social struggle over the conditions that make human life possible and meaningful and as such, are an expression of the social character of water, as

¹ A previous version of most of the material included in this paper has been published in Castro, 2006.

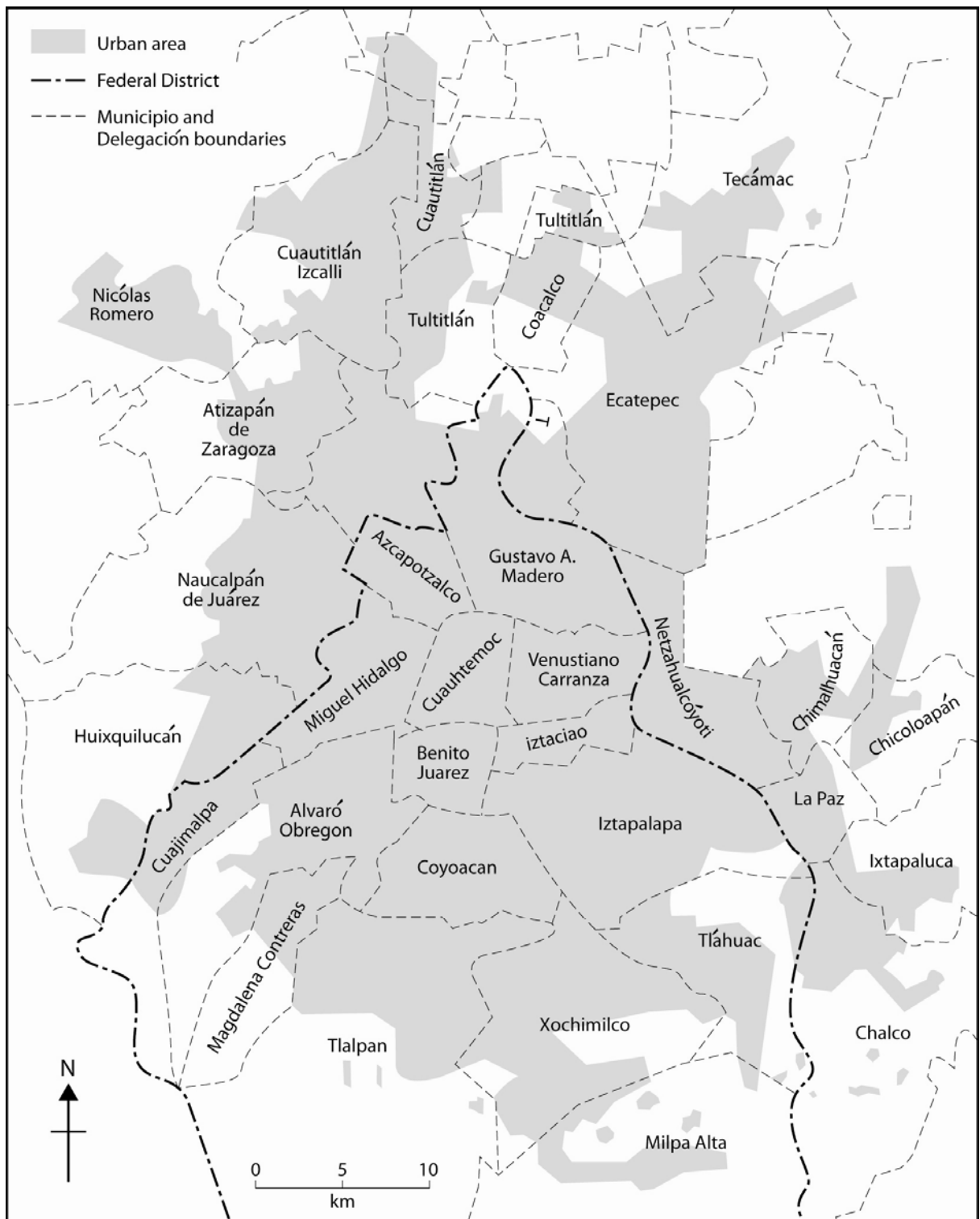
distinct from the biophysical and techno-scientific dimensions. In short, our work investigates the ways in which water, the most essential life-sustaining element, has become interwoven with the socio-economic and political processes structuring Mexican society, such as the struggle over what can be termed the territory of citizenship. The following pages contain a summary of our project findings extracted from Castro (1992; 1995; 1998; 2006).

Water conflicts in the Mexico City Metropolitan Area

The Mexico City Metropolitan Area (MCMA) (see Figure 1) enjoys one of the highest coverage levels of water supply and sewerage in the country. The officially reported average daily distribution of water of about 300 liters per capita is well above the internationally accepted standard of 100 liters to cover essential household needs. However, since the 1980s the MCMA has also been the scene of recurrent social conflicts flaring up from different problems around water and water services. As discussed later, most of these conflicts result from citizens' reactions to water-related threats and dangers that prevent them from living their lives to the formal standards prevailing in their own society.

Water-related hazards in the MCMA range from the dangers posed by recurrent flooding in the rainy season to a whole array of diseases associated with the way in which water and water services are managed. The most threatening aspect is the incidence of water related-diseases, including both old diseases associated with poverty, such as gastrointestinal and parasitic infections, and new threats derived from modern life, such as water pollution by industrial, agricultural or domestic discharges. As stated in 1991 by the then Federal Health Minister, Jesús Kumate Rodríguez, 'the main deficiency in the country's development relates to potable water ... as gastrointestinal diseases cause the largest number of deaths in the Mexican population' (La Jornada, 1991). In the Basin of Mexico, people are exposed to a wide range of water-related infections, including amoebiasis, giardiasis and viral agents, which bring respiratory, gastro-intestinal and central nervous-system disorders (NAS, 1995). In particular, acute diarrhoea is prevalent in the MCMA, and according to the 1991 census, this was the third leading cause of infant mortality in the State of Mexico and the fourth in the Federal District, with official mortality rates of 450 and 156.7 per hundred thousand, respectively. These problems are especially severe in the less urbanized parts of the MCMA, which, in general, also show the lowest rates of access to water services (INEGI, 1991). Although there is a notorious lack of systematic information about the connections between water management and public health, recent research has confirmed that preventable diarrhoeal infections constitute one of the main health hazards in the MCMA. Evidence also shows that these infections affect particularly poor children living in the peri-urban areas of the city (Cifuentes García et. al., 1999; 2003).

Figure 1: Mexico City Metropolitan Area (circa 1990)



Source: David Sansom, Cartographer, School of Geography and the Environment, University of Oxford

Other important threats come from pollutants leached to water sources, such as nitrates, toxic metals, pesticides and herbicides, which can cause acute disorders, or even permanent damage to humans, and are extremely difficult to remove in the filtration process. This type of pollution is associated with the inadequate disposal of toxic wastes, contaminated rainwater or agricultural runoff, and there is evidence of agrochemical pollution in the Lerma River Basin, one of the MCMA's water sources, where studies have found alarming levels of pesticide residues in humans. Moreover, although domestic water supplies in the MCMA are treated, owing to problems in the distribution system, such as leaking pipelines and depressurization that cause the pollution of networked water by raw sewage or other factors, there is widespread contamination of the supply at users' taps. These problems are further aggravated by the fact that 90 per cent of the wastewater produced in the MCMA is exported from the basin untreated, including a vast amount of hazardous industrial effluents. Part of this wastewater is used to irrigate around 5,500 hectares in the Chiconautla area and 80,000 hectares in the State of Hidalgo before it is emptied in the Gulf of Mexico (NAS, 1995; Cifuentes García et. al., 1993; 1995).

From the perspective of ecological and economic sustainability, although around 70 per cent of water used in the MCMA is extracted from underground sources, the rest is imported from other basins with high investments in infrastructure and energy required for pumping and transporting water over long distances. However, piped water in the MCMA is highly subsidized, and users pay only a small fraction of the real cost, although most people have to also buy expensive bottled water for drinking, owing to the unreliability of the water's quality. Nevertheless, the hazards are significantly greater for the large population settled in shanty towns in the metropolitan periphery who suffer inadequate housing conditions with poor or no urban infrastructure. These sectors are afflicted by chronic water shortages, poor quality water and higher water prices, which constitute a large share of their household income and accentuate their vulnerability to health threats.

Finally, the control and allocation of water resources in the basin is subject to acute conflicts between competing users, political entities and different agencies, which has led to a very complex structure of water governance. The increasing exacerbation of these conflicts over time has prompted several institutional reforms since the 1980s, which have formally sought to promote active citizen participation and the democratization of the structures of water governance in the metropolis. However, in practice, water policy continues to be largely unaccountable to the citizens, and despite the formal recognition that the water problems are interwoven with socio-economic and political processes, the prevailing explanations and the adopted solutions continue to underplay the relevance of the social dimension.

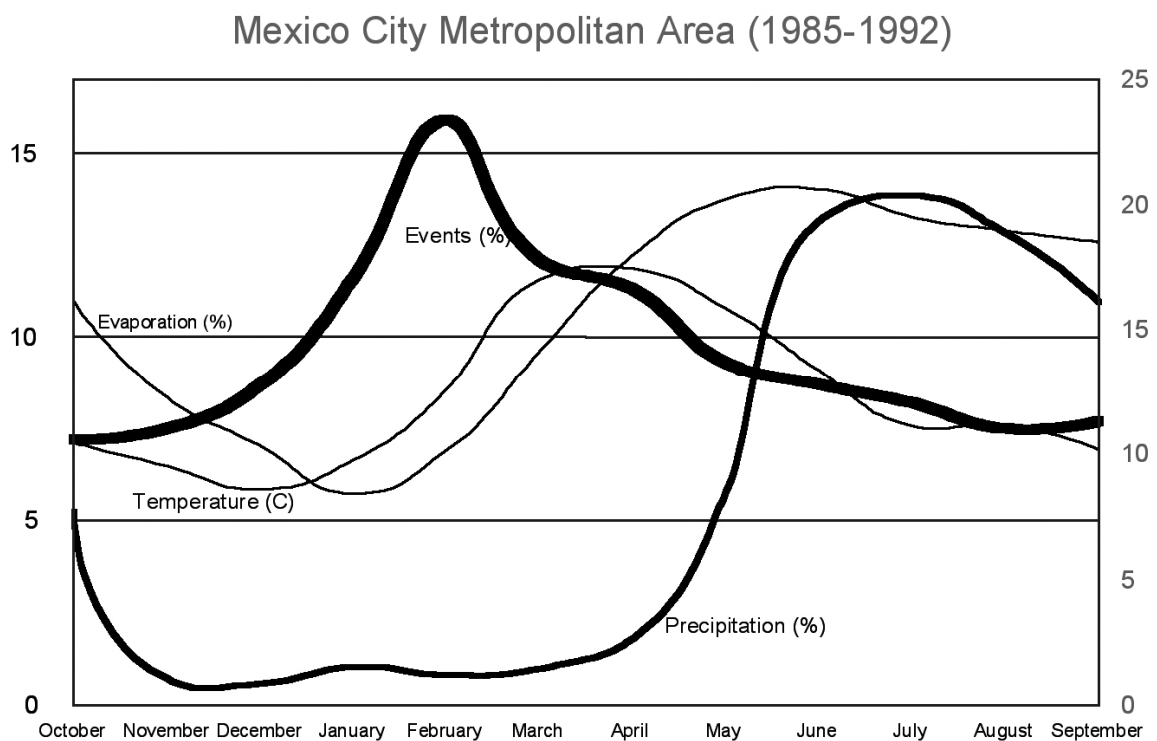
The techno-scientific approach to water conflicts

Although, from a certain perspective, a large share of the population in the MCMA is defenseless against these water threats and dangers, the widespread conflicts flaring up around a whole range of water problems recorded since the 1980s suggest that people have been active in seeking solutions or, at least, voicing their grievances. These actions range from the presentation of peaceful demands to the authorities to violent events, which in extreme cases include the destruction of property and the loss of human life. We have also found that the annual cycle of these conflicts follows closely the rhythm of physical-natural processes, such as the seasonal distribution of rainfall, and the patterns of evaporation and temperature (see Figure 2). During the period between 1985 to 1992 the number of events increases sharply

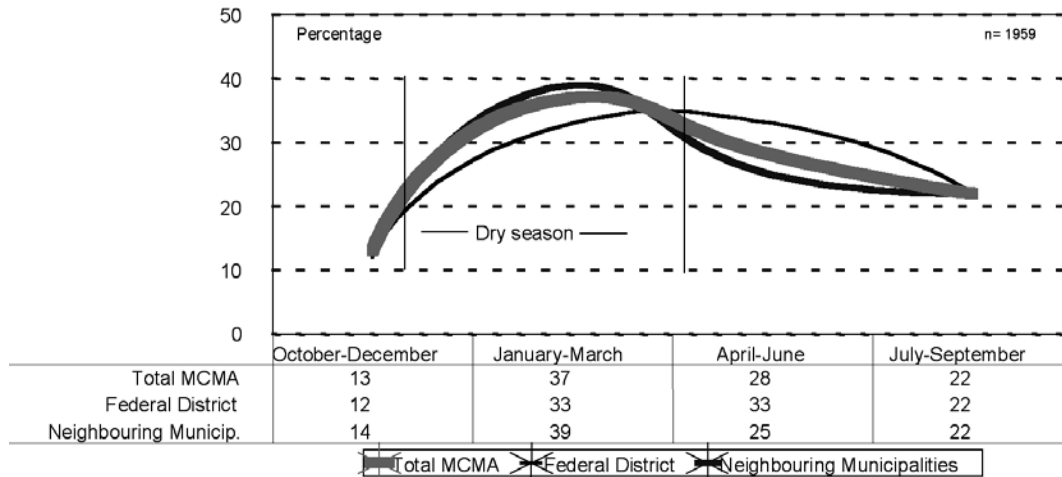
between November and December with the arrival of the dry season, reaches a peak between January and February, and begins to decline slowly from March onwards, remaining more or less stable during the rainy season between June and October (see Figure 3). Notably, this pattern differs from that of the urban conflicts over land tenure, housing problems or environmental degradation which do not have such a strong correlation with physical-natural cycles (Bolos and Perdomo, 1990).

Physical-natural and technical factors are often presented as the key explanatory factors of the MCMA's water problems and conflicts, while the crucial socio-economic and political aspects continue to be largely neglected. Unfortunately, the most influential social science contributions to this debate have also limited their scope to technical considerations, such as designing mechanisms for creating private water markets or accelerating the conversion of water services into private goods. Nevertheless, these technical contributions by social scientists have paramount social and political significance, since they have informed far-reaching institutional transformations in the water sector worldwide since the 1980s. Public policy reforms, such as water sector liberalization, de- and re-regulation and privatization, have often provoked widespread citizen reactions, ranging from public demonstrations to open violence, even leading to the collapse of national governments as in Bolivia in 2000, 2003 and 2004. However, contemporary mainstream social scientists continue to neglect fundamental socio-political considerations, such as the inequalities of power arising from the governance, management, and distribution of water resources and services, which are the main focus of this work.

Figure 2: The cycle of social mobilization over water and the rhythm of natural cycles



Source: Elaborated from Armentia, 1988-1997 and IMTA, 1996.

Figure 3: Annual cycle of water-related events

In contrast with the low importance given in mainstream social science to what we call here the social character of water, the subject has been a prime concern for the Mexican authorities for decades. This, perhaps, was helped by the high levels of social mobilization that have marked urban life in Mexico, and in which water played a significant role. For instance, since publishing the 1975 National Hydraulic Plan (PNH) Mexican water authorities have increasingly recognized the conflict-ridden nature of the nation's water management. Thus, the 1981 re-edition of the PNH introduced the notion of 'conflicts over water', and even attempted to predict sequences and levels of water conflict in the country's main ninety-three urban centres between 1980 and 2000 (see Figure 4).

Undoubtedly, acknowledging the paramount importance of water conflicts for policy and planning was a big step forward towards incorporating the social dimension vis-à-vis physical-natural and technical processes. Nevertheless, in practice the notion of conflict laid out in the PNH was limited to hydrogeological and techno-administrative features, whereby conflicts over water would be the outcome of a negative correspondence between volumes of 'naturally available water supply', 'expected water extraction' and 'expected water consumption'. For instance, the results mapped in Figure 4 were obtained by classifying cities according to the correlation between the volumes of water extracted and consumed and the volume of water naturally available, where it was assumed that the latter would remain constant between 1980 and 2000. The model predicted that cities with a favorable correlation would be free of water conflict, because the available water volumes would be adequate to meet demand, while cities where water volumes were very limited were very likely to experience water conflicts. On this basis, the PNH offered a classification of cities ranging from those already affected by water conflicts to others where 'no conflicts were expected until the year 2000'.

The PNH forecasts seem to have been largely accurate, as the empirical indicators effectively confirmed the expected trends in the cases studied. For instance, in Ciudad Juárez, Chihuahua, a city classified as subject to ongoing and future water conflicts, the correlation between water availability and consumption significantly worsened between 1980 and 2000. By contrast, in Tuxtla Gutiérrez, the capital of Chiapas, the state with the largest freshwater reserves, the

correlation remained highly favorable as predicted, and no water conflicts were expected. However, despite its accuracy in predicting the overall trend in the water balance, the model was not effective in predicting water conflicts, as events of social unrest around water problems mushroomed in both cities during this period (Castro, 1992). In fact, water problems became the leading issue in the 1988 electoral campaign for the governorship of Chiapas, and shortly afterwards the federal government launched a vigorous investment programme to improve the state's water infrastructure.

More examples can be added, but what we want to emphasize here is that water conflicts cannot be explained solely by their hydrogeological or techno-administrative aspects and that there is need for a closer examination of the interrelations between the physical-natural and social processes involved. After all, water 'scarcity' and conflict often happen where there is an abundance of water resources, as illustrated by Guayaquil, the largest city in Ecuador. Although Guayaquil is crossed by the fresh waters of the Guayas River, over one-third of the population has no access to safe water supply, while those connected to the network are subject to chronic water shortages. A protracted structure of social inequality, clientelist politics and collusion between the authorities and private water entrepreneurs are among the main factors that explain the deficiencies of the city's water systems, which in turn underpin much social and political unrest (Swyngedouw, 1997). The description can be easily generalized to many cities in developing countries. In fact, although water volumes are certainly a crucial and legitimate consideration, a closer examination shows that the availability of water for essential needs or the technical capacity to make these volumes available for human use are not the main problem.

In the current scenario of the MCMA, the socio-political roots of the reigning water stress may be much less obvious for the contemporary observer, as physical-natural constraints undoubtedly reduce the room for maneuver for water management, and their saliency tends to overshadow the social character of the process. However, we challenge this reduction of water conflict to its physical-natural and techno-administrative aspects by exploring the interdependence of hydrogeological, technical and socio-political processes.

Figure 4: Map of conflicts over water supply services in the main Mexican urban centres (1980-2000)



Source: David Sansom, Cartographer, School of Geography and the Environment, University of Oxford; SARH, 1981.

The meanings of conflict

A clearer understanding of the different intellectual trajectories represented by our epistemic subjects can be achieved by examining the meanings associated to the notion of water conflicts. For instance, when the water expert refers to conflicts over water, as in the forecasts presented in the 1981 National Hydraulic Plan, the observables are mainly quantities. The key concepts (in this case, water demand, supply, consumption and cost) point to water volumes per time units, numerical series correlating expected population growth with water volumes, meters of pipes, kilowatt hours and so on, within a certain time period. For instance, in addition to the water balances used to predict water conflicts, the official diagnosis offered by the 1981 PNH listed as key factors explaining the conflicts, the

deficient conservation and maintenance of networks and electromechanical installations; low efficiency in the uses of water due to leaks in the networks and wastage by the users; lack of financial sufficiency in the municipalities; low income in the water operational agencies due to under pricing, and social and political problems due to water transfers between regions and states, and to changing patterns in the use of the resource (SARH, 1981).

Despite this explicit reference to ‘social and political problems’, conflict is generally seen by water experts as the result of the lack of expected correspondence between quantitative variables, which was the criterion employed to develop the map of water conflicts discussed earlier. However, for water functionaries, the notion of conflict derives from a very different set of observables. Thus, they may be referring to the recurrent events of social protest in the city owing to the poor quality of the water services, to the civil disobedience of water consumers who are unwilling to pay their bills or to the more aggressive action of those who have decided to take over the offices of the water utility or to destroy water meters in protest against a new policy aimed at improving cost recovery in the water services. These actions constitute an intricate web when observed at the scale of the daily interaction between *demandantes* (claimants) or *usuarios* (users) and the water utilities.

Despite these differences in the understanding of what water conflict means, in the end these subjects have historically resorted to physical-natural and techno-administrative factors for predicting and explaining these conflicts, thus overlooking the social character of the process. Unfortunately, the most influential incursions of social science in this sector have not contributed to the reversal of this trend but rather have exacerbated the reduction of the process to its physical-natural and techno-administrative dimensions.

Making social regularities observable

If we remain within the techno-scientific and administrative framework, crucial factors underpinning the emergence of water conflicts are overlooked or underplayed. Let us consider the legal and technical requirements normally given by the water utilities in Mexico to deliver networked water services: legal land tenure and technical feasibility. Although these two requirements look straightforward on paper, when observed in more detail they actually have multidimensional ramifications. At least formally, to gain access to networked water services the claimants must have a legal title to their land in order to be ‘regularized’. However, regularization also refers to the technical feasibility of bringing the services to the neighborhood, which is often hampered by the difficult geographical locations of the most disadvantaged human settlements or by the overlapping of legal and political jurisdictions. The

fact is that claimants are categorized into two main groups according to these characteristics: regularized and non-regularized.

The number of non-regularized claimants is enormous. Just taking into account the requirement of technical feasibility, about ten million people in the MCMA, especially in the State of Mexico, live in urban areas considered unsuitable for the provision of public services, such as the rocky slopes southwest of the city or the now desiccated lake beds to the east, which are exposed to flooding during the rainy season and dust storms in the dry period. Moreover, many of these settlements have been developed illegally and are therefore not in compliance with the legal requirement of having a land title (Rowland and Gordon, 1996). These irregularities continue to be the main formal impediment for the introduction of networked water and sanitation services. As stated by a former director of the State Commission for Water and Sanitation (CEAS) of the State of Mexico when addressing the situation of around half million people lacking networked water supply in the Valley Cuautitlán-Texcoco:

Most of these people are located in 120 *colonias* [urban quarters] that are in the process of regularizing their land titles. Because of their situation, they are not creditworthy and do not pay any taxes. ... [T]hese people have settled in invaded *ejidal* and communal lands in the municipalities of Tultitlán, Ecatepec, Ixtapaluca, Chimalhuacán, Chicoloapan, Los Reyes-La Paz and the Valley of Chalco where, unfortunately, the largest irregular human settlements are located (El Sol de México, 11 March 1987).

Nevertheless, being regularized is necessary but by no means sufficient for gaining access to services. In fact, there are cases of non-regularized *colonias* that have been able to circumvent the formal requirement of regularization in order to obtain public services. However, this does not change the prevailing pattern of individuals and families being categorized as irregular or regularized: unworthy or worthy of accessing essential water services. Thus, what initially appears to be an abstract and universal identity, the claimant interpellated by the water authorities, acquires a richer texture when we explore the multidimensional facets of the problem, such as the qualitative and quantitative inequalities determining one's status in legal and geographical terms. In the last analysis, the process that determines the inclusion or exclusion of individuals and families from accessing water services is composed of a dense web of social interactions.

As social scientists, we are skeptical of the undifferentiated treatment of the population as claimants or users, which overlooks those processes that create and reproduce the structural socio-economic inequalities and injustices determining the lack of access to essential water services affecting millions in Mexico and elsewhere. In this perspective, water conflicts cannot be reduced to physical-natural and techno-administrative considerations, but rather should be analysed in their interconnections with wider socio-economic and political processes. Unfortunately, although water inequality and the constellation of social blots associated with it have become the object of laudable programs and declarations of policy worldwide, the underlying processes remain unobservable as an object of knowledge and, consequently, largely overlooked in the formulation and implementation of policy.

In this regard, we argue that water conflicts such as those identified in Mexico are part and parcel of the social struggle for widening and securing a fairer access to the conditions that are essential for human survival and the enjoyment of basic living standards. Therefore, the

significance of the actions carried out by the population in relation to water problems cannot be reduced to their techno-bureaucratic aspects, because what is at stake is the conquest and defense of the conditions that make human survival and social life possible.

Unsurprisingly, water is a recurrent object in social struggles over access to basic necessities, but these struggles constitute a territory often demarcated by rigid legal and social barriers and fiercely defended from intrusion.

The events of water conflict

There are some characteristics of the water mobilization that may contribute to reinforcing the techno-scientific reductionism of conventional explanations. For instance, the temporal distribution of water-related events resembles the hydrological cycle. In a typical year, their frequency increases sharply with the arrival of the dry season and then remains relatively stable until the rainy season brings some relief. After a period of decline in the level of mobilization, the cycle resumes with the arrival of the following year's dry period. Figures 2 and 3 above provide a graphic reading of this situation, showing separately total percentages for the MCMA, the Federal District, and sixteen adjacent municipalities of the State of Mexico.

However, although the charts suggest a clear interrelationship between the seasonal climatic patterns and the water events, a closer inspection raises important questions about the meaning and extent of the correlation. For instance, in light of the technical sophistication characterizing water management in the MCMA, the fact that the metropolis imports water from beyond the basin's boundaries, and the high levels of coverage and per capita water distribution reported officially, the interaction between the seasonal rainfall regime and the sequence of the events merits further scrutiny.

The evidence suggests that the association between the arrival of the dry season and the steep increase in social conflicts over water cannot be explained as being just the outcome of the 'natural' hydrological cycle. As expressed sarcastically by one of the protagonists of the events, 'in some urban quarters the dry season has been with us for over 15 years' (Metrópolis, 30-May-1989: 2). The dry season undoubtedly exacerbates water scarcity and the problems associated with it, but water scarcity is the outcome of interwoven and relatively autonomous physical natural and social processes.

One indicator of the degree of autonomy of social patterns vis-à-vis physical-natural cycles is the differential weight of the social mobilization over water in the Federal District and in the neighboring municipalities of the State of Mexico. As shown in Table 1, while the Federal District contains over 58 per cent of the MCMA population, only 33.5 per cent of the recorded events of water mobilization occurred within its territory. However, though the mobilization is more intense in the densely populated municipalities than in the Federal District, there exist large differences between jurisdictions. In the Federal District, over 46 per cent of the events were concentrated in three of the sixteen *delegaciones*: Gustavo A. Madero, Iztapalapa, and Tlalpan.

Likewise, in the State of Mexico seven out of the sixteen municipalities accounted for 73 per cent of the events: Ecatepec, Naucalpan, Chimalhuacán, Tlalnepantla, Atizapán, Netzahualcóyotl, and Chalco.

**Table 1. Relative weight of the events (comparative percentages).
Mexico City Metropolitan Area 1985-92**

	Population	Events
Federal District	58.2% (8,235,744)	33.5% (656)
Conurbated Municipalities	41.8% (5,913,863)	66.5% (1303)
Total	100% (14,149,607)	100% (1959)

Source: Elaborated from INEGI (1991) and Torregrosa Armentia (1988-97).

This spatial distribution of the events may be connected with the process of demographic and urban expansion, as the *delegaciones* and municipalities where the larger proportion of cases are concentrated are also among the most affected by massive population growth since the 1960s. This is the case of Tlalpan, Iztapalapa and Gustavo A. Madero in the Federal District, which recorded population increases of up to 1 million people each between 1960 and 1980. Also, municipalities such as Netzahualcáyotl, Naucalpan, Tlalnepantla, Ecatepec, Atizapán, and Cuautitlán Izcalli had the highest rates of population growth between 1960 and 1980, which in the case of Netzahualcáyotl meant a net increase of over 1.2 million people. During the 1980s, the most dynamic municipalities were Ecatepec, Chalco, Atizapán, Chimalhuacán, Tultitlán and Cuautitlán Izcalli, while Netzahualcáyotl and Tlalnepantla experienced significant decreases (Bolos and Perdomo, 1990).

However, the explanation of the conflicts over water cannot be reduced to the impact of population and urban growth. Understanding the situation of defenselessness and extreme vulnerability affecting millions in the MCMA, not just in relation to water, requires the introduction of additional explanatory factors, which unfortunately we cannot discuss here due to space constraints (see Castro, 2006 for a more detailed analysis).

The structure of the events

We analysed the water events by looking first at their internal components, such as the actors involved, their targets, the stated cause of the action and the instruments employed. Then we aggregated the cases into different combinations according to key characteristics, such as level of organization of the protagonists. Let us say that the sharpness of the analytical categories and components presented below is a necessary simplification for heuristic purposes, as we do not wish to reify the data presented in tables nor the individual examples listed below. We use quantitative information to map the events and provide orders of magnitude that facilitate the understanding of the dynamics and directionality of the process, while the description of selected events offers a closer look into the multidimensional structure and interconnections of the struggle as a whole.

The protagonists

An engagement implies the confrontation of two sides, an agent that takes the initiative and carries out certain actions against an opponent, an adversary. Let us call the actor that takes the initiative the 'protagonist'. The protagonists of our events range from individual members of the community, without demonstrable links to groups or organizations, to highly structured and disciplined collective actors, such as political parties, workers unions or NGOs. However, it was not always possible to specify the identity of the protagonists or the nature of the organizations involved from the information provided in press reports. Local associations and neighborhood committees, for instance, may be the outcome of self-organization, in which people join forces in their search for the introduction or improvement of water services or in response to the complete interruption of the water supply for long periods. However, frequently the creation of organizations is also stimulated from above, either by the government, political parties, workers unions or foreign-funded NGOs, among other external agents.

In any case, the character of the protagonists must not be taken for granted or seen as static: on the one hand, self-organized actors can be co-opted or penetrated by more powerful organizations or state agencies, which can then influence if not totally control the original actors. On the other hand, top-down organizations designed to secure political control over popular movements can develop autonomous initiatives or, to put it in other terms, can also be co-opted by grassroots processes. This happened, for example, in some municipalities during the early 1990s with local officers of the National Solidarity Programme, PRONASOL, launched by President Salinas, who enjoyed a higher degree of autonomy from the centre and was sometimes responsive to local causes, even joining or awakening centrifugal forces. Furthermore, depending on the level of analysis, the same protagonists can become vectors of contradictory forces. In another example considered below in more detail, a local community from Ecatepec defended their right to keep control over a water system (a well and a network of household connections) that they had built when neither the state nor private entrepreneurs were interested in providing them with water services. They then managed and maintained it efficiently for many decades. Although theirs was a de facto decentralized, self-sufficient and community-managed water utility not dependent on government subsidies, which in theory would fit in with the policies of administrative decentralization and civil society participation promoted by the government since the 1980s, in practice the authorities interpreted their refusal to hand over the water system as unlawful. What was very likely a legitimate action of the community observed at the local level and in historical perspective, constituted for the authorities an act of opposition to the new policies directed at integrating water management activities under state control when observed at the basin level. This illustrates the multi-scale and multidimensional character of the process captured in the water events.

Returning now to the character of the protagonists, although two-thirds of the events were performed by agents with some degree of organization, the number of cases carried out in apparently spontaneous circumstances, without an observable level of organization, is noticeable (see Table 2).

Table 2: Level of organization of the protagonists: MCMA 1985-92

	Events		Total % (number)
	Without organization % (number)	With organization % (number)	
Federal District	42.3% (264)	57.7% (360)	30.9% (624)
Conurbated Municipalities	24.2% (260)	75.8% (814)	69.1% (1,174)
Total MCMA	100% (624)	100% (1074)	100% (1,698)

Source: Elaborated from Torregrosa Armentia (1988-97).

Interestingly, in contrast to the Federal District, where non-organized protagonists accounted for over 42 per cent of the events, in the neighboring municipalities organized action was made up over 75 per cent of the cases. Most of these actions were carried out by local protagonists, who accounted for over 60 per cent of the total number of events. In this respect, the breakdown of the data according to the level and type of organization of the protagonists reveals the central role played by local institutions, such as neighborhood associations or the local offices of political parties, workers unions and other social organizations. This centrality of the local in the events is reinforced by the presence of municipal authorities and politicians, particularly in the State of Mexico, where they often confronted state or federal authorities over water problems in defense of the specific interests of their communities. Moreover, non-organized protagonists, among which the role of women was paramount, were also mainly locally based.

However, the participation at the local level of regional and national organizations, such as political parties, workers unions or NGOs, suggests that the scale of the events may well extend beyond the neighborhood. For instance, even small community groups often joined forces with peers from neighboring *colonias* and neighbourhoods, a feature recorded with more frequency in the State of Mexico (20 per cent) than in the Federal District (only 5 per cent) (Bolos and Perdomo, 1990).

The opponents

The antagonists in the water events have wide-ranging identities and share the characteristic of being held accountable by the protagonists for water-related problems. Unsurprisingly, a large share of the events targeted local authorities and water utilities, although a significant number of cases were also directed to state and federal authorities, private organizations and individuals (Table 3).

Table 3. Actors targeted by the protagonists. MCMA 1990-92

	Federal District	Conurbated Municipalities	Total
Federal/state authorities	30.2% (81)	26.1% (112)	27.7% (193)
Local authorities	52.6% (141)	55.9% (240)	54.7% (381)
Other actors	17.2% (46)	17.9% (77)	17.6% (123)
Total MCMA	100% (268)	100% (429)	100% (697)

Source: Elaborated from Torregrosa Armentia (1988-97).

Most actions targeted municipal departments or the local offices of state or federal bodies, such as the Ministry of Agriculture and Hydraulic Resources (SARH) or the Ministry of Urban Development and Ecology (SEDUE). The category ‘other actors’ includes people or organizations enjoying a degree of social power related to water and water services such as ‘local leaders’, ‘urban speculators’, the drivers of water trucks (both private and municipal) and local businesspeople. These actors are targeted because the protagonists hold them responsible for real or perceived grievances, such as massive clandestine water tapping by hotel owners, power abuses by municipal water distributors and overcharging for water by private vendors.

Interestingly, in an important number of cases, the protagonists do not have a clear antagonist, a culprit or a well-identified opponent. For instance, in some cases the actors recognize that the solution to the problem is beyond the reach of the local authorities, bureaucrats and technicians and blame the ‘current policies’ or the ‘economic situation’ for the particular issues that moved them to action. In other cases, they mention natural factors such as drought, excessive rain, heat and parasites as the causes of their complaints. In some circumstances, the lack of identifiable targets may be an indicator of institutional crisis, as suggested by one case in which the protagonists could not identify who was responsible for providing water services in their neighbourhood, which was trapped in an inter-jurisdictional conflict between the municipality, the state, and the federal government.

Reasons for action and instruments employed

Although water is the obvious object underpinning the events, the immediate reasons given by the protagonists to justify their actions are wide-ranging and distinctive. For analytical reasons, we have grouped the causes of the events into three main sub-dimensions (see Table 4):

- actions to gain access to water or essential water services
- actions around deficiencies in the delivery of essential water services
- actions involving the control over water resources and water infrastructure.

Table 4: Stated causes of the events: MCMA 1990-92

	Federal District	Conurbated Municipalities	Total
Gaining access to water and essential water services	32.1 (165)	28.2 (271)	30.0 (436)
Requesting improvements in technical-administrative standards	58.6 (301)	55.8 (525)	56.8 (826)
Controlling water and water infrastructure	9.3 (48)	15.4 (145)	13.3 (193)
Total MCMA	100 (514)	100 (941)	100 (1455)

Source: Elaborated from Torregrosa Armentia (1988-97).

The first group includes cases in which the action seeks to overcome legal, technical or administrative impediments precluding access to water and essential water services. The second concerns problems such as the irregularity or poor quality of the services, unfair pricing, administrative and operational inefficiency and water speculation. Finally, in the third group, we singled out those events where the social and political aspects of water control become more evident, such as competition for water sources, conflicts over the control of water infrastructure and confrontations concerning the legal status of water, which during the period under study the federal authorities were trying to change from a public to a private good.

Regarding the instruments employed by the protagonists, we identified five main categories: petitions, denunciations, mass mobilizations and parades, threats and direct actions. In most cases the protagonists utilize a conjunction of different instruments when carrying out their actions, although the most common recourses were the petition and the denunciation, which convey different degrees of antagonism. The petition is normally a formal request addressed to the authorities asking for the connection or restoration of water services. Although most cases are obviously directed to the local water and political authorities, petitioning is often routed to higher-ranking echelons and, typically, to the President of the Republic, reflecting both the frustration of the claimants and the long-lasting Mexican tradition that gives the President a fatherly authority, even over domestic affairs.

Table 5: Instruments employed by the protagonists. MCMA 1990-92

	Federal District	Conurbated Municipalities	Total
Petitions	5.3 (14)	5.3 (24)	5.3 (38)
Denunciations	80.3 (212)	66.5 (302)	71.6 (514)
Mass mobilizations/rallies	7.2 (19)	10.6 (48)	9.3 (67)
Threats	5.7 (15)	9.3 (42)	7.9 (57)
Direct actions	1.5 (4)	8.4 (38)	5.9 (42)
Total MCMA	100 (264)	100 (454)	100 (718)

Source: Elaborated from Torregrosa Armentia (1988-97).

Denunciation is the next step among the actors' tactics, and they normally resort to it when the petitions have failed to attract the attention of the authorities, though denunciations can also be triggered for other reasons, such as exposing power abuses by water vendors or clandestine water tapping by industries or hotels at the expense of domestic users. There are two main types of denunciations: those directed at the authorities, aimed at resolving a given situation and those directed at the media with the purpose of raising public awareness of irregular situations and thus moving the authorities into action. Denunciation is by far the most common instrument employed by the protagonists in the recorded events, although there is an important difference between the Federal District, where denunciations accounted for over 80 per cent of the events, and the densely populated municipalities, where the figure drops to 66.5 percent. That most events were denunciations can be partly explained by the fact that the press was the main vehicle used by protagonists to publicly voice their demands and complaints about water issues during the period of study.

The third type of instrument employed is public demonstration, through parades, open meetings and other forms of collective and mass mobilization that usually take place in the local *Zócalo* (public square), in front of government buildings, main roads and other public spaces. The fourth type is the threat of further action, normally a warning that direct action will be taken if there is no response within a given period of time. The content of threats range from implementing actions of civil disobedience, such as non-payment of water bills and taxes, blocking roads and the occupation of buildings, to the kidnapping of water officers, the theft of vehicles and the destruction of goods and infrastructure. The fifth and last type of instrument is the materialization of the threats.

There is a significantly higher occurrence of events involving mass parades, threats and direct action in the desely populated municipalities than in the Federal District. This may be the

outcome of the more extreme conditions of vulnerability affecting the provision of water services recorded in the municipalities, or perhaps this reflects the fact that protagonists of the events outside the Federal District find formal channels, such as petitions and denunciations much less effective. Also, this may be indicating the looser public control over water operations in the State of Mexico, which leaves water resources and services more exposed to political manipulation and factional power struggles between individual or collective water lords.

Concluding Remarks

Undoubtedly, the main motivation for the actions of most protagonists of the events is ensuring continued access to the essential services of safe water supply and sanitation. However, we have argued that the events cannot be explained away only by reference to their techno-bureaucratic or administrative dimensions or to the impact of physical-natural or socio-demographic determinations on the management of water and water services. From our perspective, these events are part of a structural social confrontation to overcome the qualitative and quantitative inequalities preventing millions from full access to the territory of citizenship, a confrontation that is largely independent of the protagonists' individual wills and reason. The autonomy of the process from its individual manifestations is clearer when analysed at the level of the combined result of multiple events happening throughout the complex spatial setting of the MCMA. Thus, the struggle over water cannot be reduced to the action of politically conscious protagonists, but must be also explored in connection with the largely unplanned political outcomes of the process. Unfortunately, the most influential contributions by social science in the field of water policy and management since the 1980s have reinforced the already prevailing technocratic approach to these issues by playing down social, political and cultural dimensions in their analyses.

Our study attempts to underline the importance of social struggle and power configurations for understanding the interweaving of social and physical-natural processes. However, we have attempted to avoid the reification of the empirical manifestations of the struggle, as our interest has been to deploy the concept as a heuristic device to capture the multidimensional and long-term character of the processes under consideration. Therefore, although the research was triggered by our interest in understanding the meaning of the water conflict recorded in the Basin of Mexico during the 1980s and 1990s we have placed these events in the wider context of the struggle over citizenship.

In this regard, the reasons driving the protagonists of water conflicts to act were multifarious: most of these events were discrete and unconnected, and most actors may have been unaware at the time of the multidimensional character of the process and the unintended implications of their purposeful action. Yet, we argue that these apparently unrelated contests are part and parcel of an evolving social confrontation that is autonomous from the actors' individual wills and reason. It is part of the struggle over the territory of citizenship, a territory composed of unfolding bundles of rights and duties formally bonding all individuals within a given community, but in practice is punctuated by structural exclusions and, therefore, the object of permanent and recurring social contests.

Comprehension and understanding of the multidimensional character of the process has been hindered by the overriding techno-scientific and bureaucratic rationality characterizing water governance and management which has historically contributed to render unobservable the

social character of water. Unfortunately, social scientists' most influential incursions into the field of water policy since the 1980s have tended to reinforce this unbalanced understanding of water problems. Thus, the far-reaching water-sector reforms informed by these policies have strengthened technocratic tendencies in water governance and management and continue to shift the focus away from fundamental socio-political considerations. In consequence, problems ranging from widespread water inequality and poverty to the depletion of aquatic ecosystems are reduced to their techno-scientific and bureaucratic aspects. Therefore, 'technical' solutions like converting essential water services into private goods or re-centering water governance around 'non-political' free-market principles have been the rule. Our work attempts to provide a framework for overcoming this prevailing reductionism and to contribute to the development of meaningful transdisciplinary coordination across the natural and social sciences in order to better grasp the multidimensionality of the processes involved.

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Urban water conflicts in Indian cities: Man-made scarcity as a critical factor

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I am not the minister of Water Resources but the minister of water conflicts¹
- Indian Minister of Water Resources

Introduction

Most cities in India are facing severe water scarcity. Other problems and concerns pertain to quantity and quality, equity across different segments and different sections of population, poor sanitation, ineffective and obsolete wastewater management practices and lack of long-term vision, planning and motivation. Cities expand at a rapid rate and use up resources like land and water available in peri-urban areas. While land in peri-urban villages is taken by urban housing, industrial premises and for dumping urban wastes (both solid and liquid), very little is ploughed back by way of developing these areas. The process of urbanization cannot be blind. It should ensure the sustainable use of natural resources, in particular land and water, and even more so groundwater. Indeed, very little attention is paid to investigating the role of groundwater in the process of urban development. Available groundwater exploitation is unplanned and unregulated, resulting in ecological degradation. In India, not only is water never a part of urban planning, the peri-urban issues are completely ignored and given the least importance in the overall planning process. This has resulted in serious livelihood problems in these areas. Furthermore, such unconcerned and unplanned urban expansions have triggered conflicts between urban and peri-urban interests.

¹ Quotation of the Minister for Water Resources, in a 2005 World Bank report on the water sector status in India.

Resource scarcity is certainly one of the reasons for such conflicts, but resource scarcity is not only the consequence of hydro-geological factors: most often it is man-made (Janakaranjan, 2004). Regardless of its causes, the consequences imply that water supply (both quantity and quality) are very much part of concerns such as urban water environment, water supply and sanitation. Moreover, as indicated earlier, the looming threat of serious conflicts in resource sharing between cities and their peri-urban and rural areas is something that needs due attention. This question is of growing importance in the ongoing context of Indian urbanization.² Keeping these two elements, this paper highlights the resource dimension in urban water conflicts along with conflicts that have surfaced in the process of service provision in cities in India, such as private sector involvement

One of the new Millennium Development Goals for the coming decades is the priority given to access to safe drinking water and its financing. The failure of policies inviting investment from the water multinationals was discussed at the Johannesburg World Summit on Sustainable Development in 2002. Two opposing viewpoints emerged: following the Camdessus report, advocates of the private sector are trying to work out ways of reducing the risks for operators, while challengers of water multinationals stress the growing disparity of water access in the cities of developing countries (Lobina and Hall, 2003).

In India, this debate did not correspond to observed reality; until recently with the very controversial Delhi water sector project. Indeed, with the exception of short duration contracts for the construction of water treatment plants, attempts to initiate large-scale projects with the international private sector have failed³ (Zérah, 2001). Private operators are not wholly absent, but they are small in size; they undertake local contracts, involving a limited number of operations and no investment on their part (Zérah, 2003). There are two main institutional arrangements for water services. Specific urban water bodies are in charge of water supply and sewerage. Beyond a certain size and level of autonomy, cities also take responsibility for water resource development. For smaller towns, the State (state department or state-promoted agencies) plays a major role, especially in water resource development. In the case of mega cities (where population exceeds 4 million), supply is either managed by the Municipal Corporation or remains under the control of a separate water supply and sewerage board. Supposedly, these boards are financially and organizationally more autonomous. Urban water supply is thus largely dominated by the public sector, yet restrictions on access (complete or partial) are no less real, mostly because of the inefficiency of the public service (Zérah, 1999; Llorente, 2002).

This paper is organized into four sections. The first aims at refining a definition of urban water conflict, while the next two deal with case studies of Delhi and Chennai (formerly Madras). The case of Delhi addresses conflicts linked to water access and to the

² Very few articles can be found on peri-urban areas; see Kundu et al. (2002) and Annapurna Shaw (2005) on the specific dynamics of peri-urban zones.

³ Various factors explain the absence of concession contracts: absence of a political will, civil society opposition, very low tariffs – which make it impossible to achieve economic equilibrium, insufficient return on investment, lack of guarantees on the part of the federated States and the Union, etc.

compensatory strategies associated with it. The study of Chennai looks at the most critical conflict, opposing the city and the peri-urban villages, as continuous water transport, in order to supplement the city's drinking water needs, has drained water resources in peri-urban villages. A final section aims at considering the rather unsuccessful results of existing conflict resolution mechanisms in place. This socio-economic analysis will enable us to point out the main reasons that explain why conflicts are emerging. It will open the debate on the community and cooperative solutions that could be implemented at best or at minima.

Our acceptance of urban water conflicts

A conflict always implies, irrespective of its origins, objectives or progress, an opposition between at least two categories of actors, whose interests are temporarily or fundamentally divergent. We shift from a tension to a conflict when one of the parties implements a credible threat. There are several indicators. For instance, one can use the media, or bring the other party before the courts or produce some signs (like a notice) or finally, both parties can enter into a direct confrontation (verbal or physical).

Conflicts can generate debate or fights, but they can also lead up to new arrangements. Therefore, we want to underline that a conflict does not necessarily constitute the last step of the degradation of a relation or a market failure. A conflict is a modality of coordination and negotiation, and as such, it can contribute to change, which can be both 'positive' and 'negative'. In our present context, the word 'conflict' need not be understood as referring to physical violence. It should rather be seen as a potential force for competition and change. This competition could lead to the stagnation or advancement of an economy, depending on the degree of cooperation among stakeholders.

In the particular context of Indian cities, water conflicts take place due to one critical factor: scarcity, which is caused by imbalance between supply and demand, as service provision is inefficient⁴ and groundwater is depleted and/or polluted. Excessive unregulated pumping results in the long-term lowering of water tables (in some cases, the damage due to depletion is irreversible), and groundwater pollution is caused by discharge of industrial effluent, use of chemical inputs in agriculture and leakage of domestic and municipal sewage. The result of both of these cases is scarcity – by means of over-extraction in the first case and contamination in the second.

This man-made scarcity increases competition between water users – both present and future. *We assume that a situation becomes conflictual when the existing conventional mode of supply does not suffice to provide water.* Urban water conflicts in India can generally be divided into one of three main categories or, more often, a combination thereof:

⁴ We usually enumerate the following failures: wastage, bad maintenance, low service recovery, irrationalized expenses, lack of skills, lack of integrated management, no interest in sanitation leading to environmental problems, etc.

1. conflicts linked to *quantity*: conflict arises between sectors or users, like municipality vs. industries, connected vs. unconnected people, urban vs. peri-urban, present and future generations
2. conflicts linked to *quality*: unsafe water reduces the availability of potable water and causes water borne diseases; poor people are more affected as they do not have any way to treat water; it is too expensive; domestic users complain to the municipality
3. conflicts linked to *water access*: legal (water rights), economic (price) or physical barriers prevent access to water and their unfair settlements generate conflicts, for instance, all the compensatory modes of provision are equivalent to a sign that reveals the conflict (see the Delhi case).

In all the cases, the protagonists have unequal bargaining powers, and there are winners and losers. Seldom will a conflict generate a win-win situation, mostly with regard to sustainability criteria. We shall analyse this in the cases of Chennai and Delhi in subsequent sections.

Conflicts linked to the issue of water access in Delhi

In Delhi, the public undertaking, Delhi Jal Board (DJB), is unable to meet the water and wastewater needs of the nation's capital and provides its citizens with an erratic and unequally distributed water supply that is well below international standards. The mismanagement of water particularly affects the urban poor: the volume of water available in slums is around 27 litres/capita/day (Llorente, 2002). On the other hand, groundwater is depleting very fast as people get water from private wells to fulfil their needs. Until now, the solution adopted by the municipality consisted in supply-oriented partnerships, such as the construction and management of new water treatment plants, which resulted in adding more capacity to a leaky network. Low quality of service delivery was endemic and is becoming acute. The situation is very conflictual among users, and there is sharp criticism of the existing conventional mode of supply, e.g. water supplied through a centralized network.

The Government of India (GOI) and the Government of the National Capital Territory of Delhi (GoNCTD) recognize the urgent need for reform. They have therefore requested the World Bank's support in helping DJB improve the reliability, sustainability and affordability of Delhi's water supply and sanitation services. But the proposed water project, resulting from a consulting study, has been shelved because it has been much criticized by NGOs. Water delivery as a basic service is inextricably entwined with ideology and politics, which exacerbate conflicts.

Water access conflicts materialize through alternative provision modes (or compensatory strategies) and all the inequities that are generated as a result. Limitation of access is less rigid for the better-off households, but on the whole, these modes appear unsustainable (Llorente and Zérah, 2002). However, some exceptions illustrate the potential capacity of conflicts to generate sustainable change; they depend largely upon the degree of cooperation among stakeholders. A review of several of these practices will question their impact on access and their ability to prevent conflict in the long run.

Ideological debate on Delhi's water reform project favours business as usual

The World Bank has been approached by the Government of India and the Government of Delhi (the National Capital) to support a programme that would improve the reliability, sustainability and affordability of water supply and sewerage services provided by DJB. It is planned to gradually improve service management,⁵ extending the infrastructure to underserved parts of the city and financially strengthening the water utility through the recovery of efficient cost of operations. GoNCTD and DJB have initiated a consultation on the proposed programme. This is, in fact, the starting point of the controversy that attracted all the attention, more even than the project itself.

Stakeholders requested clarifications on the role and position of the World Bank in this process. As of late July 2005, the Bank was accused of putting pressure on the Indian government to select Price Waterhouse Coopers (PWC) for advisory work on the Delhi Water Sector Project. The Indian anti-corruption group, Parivartan, used national freedom of information laws to gain access to the correspondence between DJB, which oversees water supply in the Indian capital, and World Bank officials (Parivartan, 2005). The World Bank country director for India said 'the insinuation that the Bank attempted to favour PWC is completely unfounded'. But details given by Parivartan have put the Bank in an awkward position.

The project is currently in the preparation stage: DJB is still in the process of designing and studying various aspects and preparing final documentation. The Bank's Board of Executive Directors will consider approving the loan only after this process is completed and has been appraised by the Bank. So far the Bank has provided a sum of US \$2.5 million under a project preparation facility to enable DJB to prepare the project.

As the controversy surrounding the Bank's role expanded, a campaign against the project itself also came to light (fear of a hike in tariffs, unequal access, etc.). Some resident welfare organizations and opportunistic politicians have joined the contestation movement, which probably stems more from a feeling of general discontent. But misunderstandings and the use of rhetoric on both sides have made everyone lose time and direction, and business-as-usual is the result. The case of Delhi illustrates how politically sensitive the water sector is to reform, particularly since the power sector is also facing a crisis and residents are fed up with inefficient public services. However, this opposition also reflects the vested interests of the middle class as well as its will to conquer political space and influence politicians. The first priority is to focus on public action reform and redefine the role of the different institutions involved in the governance of the water system. The key question is thus to find out the incentives that would lead the government and public agencies to perform these new roles and become accountable. It is certainly the main issue underlying the largely misleading public vs. private debate.

⁵ The objective is to achieve a 24x7 water scheme, first in some pilot zones.

Alternative responses: An emerging conflict between present and future generations

In most Indian cities, the distribution system is inequitable in the sense that many areas are not served, including peripheral neighbourhoods (both rural and newly constructed dwellings) and many slums settlements.⁶ This is due to discontinuous spatial development and will probably persist along with the growth of the urban population. Both poor and well-off people are therefore affected by the lack of infrastructure or by inadequate supply, but of course not in the same proportion vis-à-vis their respective revenues.

In this context of highly inefficient public supply, people have developed compensatory strategies, which we call 'decentralized governance structures'; alternative modes of supply have emerged, the social, economic and environmental sustainability of which is questionable. They can be divided into two categories: formal and informal strategies.

Formal strategies consist of relying on private operators, which sell water in large quantities via water tankers (containing around 12 cubic metres). Many people also buy bottled water and water in jars; however, such strategies are affordable only to high-income households. The major problem with these sources is that water quality is not guaranteed, and some opportunistic firms simply resell public water or sell untreated groundwater. The absence of any regulation in this sector has enabled the emergence of small companies with a short-term strategy. Such companies have taken advantage of a booming market without investing in quality equipment and operate at a low cost.

On the other hand, companies that set up sophisticated production lines with a view to establishing themselves in the market on a long-term basis have complained of this unfair competition. They are also dissatisfied with the high taxes imposed by the State Government in Delhi (bottled water is considered a luxury item) and favoured stricter regulations, which, as of 2002, had not been approved. So far, these private ventures, which are a direct result of the inefficiency of the public sector, have not been able to come up with innovative solutions to provide services at affordable prices and to warrant the safety of water. The solutions they offer are only peripheral and temporary ones.

Informal strategies are external to any market structure. Poor and well-off households alike develop such strategies. Most of the time, the poorest people 'free-ride' on public water via illegal connections onto which they install cheap devices to pump water from the network. Higher-income households adopt more expensive strategies: some install electric pumps in order to pump more water from the network and get better pressure, whereas others store water in rooftop tanks or dig tube-wells and rely on groundwater.

The unsustainability of current arrangements

All compensatory strategies generate direct investment costs (storage facilities, motors, filters, etc.). In 1995, in Delhi, the cumulated expense of households for such strategies

⁶ Some of these have legal status while others result from illegal land occupation (squatter settlements).

was 6.5 times higher than what they pay directly to the public undertaking. Today, one can hypothesize that this figure is even higher.

The aggregate cost of water unreliability at city level is equivalent to almost twice the amount of the annual expenditure incurred by the former Delhi Water Supply and Sewerage Disposal Undertaking (Zérah, 2000). From an economic viewpoint, these decentralized strategies are not the most efficient, and they are clearly not sustainable.

Moreover, these private arrangements (formal and informal) also generate indirect costs for society as a whole, as they contribute to the deterioration of existing infrastructure through unauthorized water connections. During service interruptions, contaminated water enters the network and increases the risk of waterborne diseases. Multiple unregistered private tube-wells deplete water tables. Finally, private arrangements aggravate the water shortage and congestion phenomena. In other words, a system of negative externalities becomes self-sustaining with a harmful impact on the environment and on users' health.

Yet storage solutions, rainwater harvesting and water supply via tankers may offer acceptable temporary solutions, provided that a well-defined regulatory framework is implemented and enforced, to avoid the present day chaos. Community participation in the management of decentralized infrastructures could then help. Our work and other research suggest that the institutionalization of community participation mechanisms is desirable for at least three reasons. First, it would allow the additional costs of compensatory strategies to be internalized and enable a more equitable redistribution system to be set up. Second, householders would be provided with an effective means for ensuring that the infrastructure is properly maintained. Third, water resources would be more effectively managed by a demand-oriented approach and facilitating leak detection. Thus, access rights to water would be secured.

However, this would require major institutional change and, in particular, the democratic representation of all interests, the setting up of agreed-upon negotiation procedures and the abandoning of patronage relationships (Haider, 1997; Llorente, 2002). Current strategies are a response to an inefficient service administered by an incomplete institutional environment that is unable to provide suitable incentives. They are affected by the absence of formal rules, which results in a chaotic allocation of the resource. Although they are not sustainable, the existence of such arrangements suggests that reform in the sector should be analysed in a systemic way and that consideration should be given to the opportunities offered by decentralized governance structures. By a systemic approach, we mean analysing all interaction between the agents, the resource and the institutional environment. In the case of water, this analysis reveals huge differences between developed and developing countries, which preclude the mere transposition of a contractual model without any other kind of consideration.

The conflict as an adjustment tool: Cooperative action initiated by slum communities

In this situation, aggravated by the lack of public financing, new approaches stress the role of community-based organizations, especially in the poorer districts. They are subject to several underlying assumptions. First, these much more flexible and innovative modes of organization can better meet demand in the poorer areas. Subsequently, within

the context of public projects, it is more effective to let the users themselves take the financial and technical responsibility for maintenance of the infrastructures (Nitti and Sarkar, 2003). In both cases, there is a positive feeling that the communities are more capable of managing the problems of access at their own level. As a result, one can witness new forms of collective action, initiated by private individuals from disadvantaged communities, or by communities themselves, and by the public operators. These modes of service are still at the experimental stage in Indian towns but offer new perspectives outside the trinomial of inadequate public service, individual compensatory strategies and private lucrative niche markets.

Recent studies (Raghupathi, 2003) give an account of certain rather innovative practices in a few Delhi slums. For instance, in an area where DJB's water service is erratic, a resident digs his own well, installs a powerful motor, and lays a rudimentary system of pipes through some nearby alleys. This 'network' can service about 200 households, for which the cost of individual connections amounts to the expenditure incurred on the necessary plumbing. The household also pays a monthly subscription, six or seven times higher than the cost of municipal water, but in return gains the advantage of a home service and neighbourhood service. In the area under study, such initiatives have multiplied, and this new type of service reaches a large section of the slum. In fact, the sums invested, often by taking a loan, are recovered in two years. Such an arrangement confirms that households, even those that are the most impoverished, are capable of generating funds to pay for water, as many international and Indian studies have demonstrated. In this case, the process of commercialization emanates from within civil society itself: the enterprising players transform an individual solution into a common alternative.

Other modes of supply owe less to private initiative than to genuine collective action, e.g. the *gali* or alley taps described by Tovey (2002) in a very detailed analysis of three slums. Users contribute jointly to the installation and maintenance charges. A simplistic vision would be to view these *gali* taps merely as the action of residents who have organized themselves to dig channels and lay pipes for supplying water to a particular alley. This would normally result in the proliferation of illegal connections, which is condemned by the authorities. However, when conducting a chronological analysis of the connections, the author highlights the role of political patronage and/or of local leaders as a triggering factor. Once the mechanism is operational, informal relationships come into play that sanction and maintain these connections. These relationships can take different forms, depending on the type of area and the relationships developed by the local leaders. In each case, they involve different players (the police, local elected representatives, parliamentarians and employees of DJB), and they mobilize a certain form of collective action. We are specifically concerned with the way in which regulations of the *gali* taps are instituted at the resident level. According to Tovey (2002), the modus operandi that all users have implicitly accepted largely depends on the local context of the resource,⁷ i.e. to the distribution of the resource and its mode of management. At several levels, it is rooted in a hierarchical system of the attribution of rights. Households that contributed financially to the *gali* taps have priority. Residual rights are then granted to the tenants,

⁷ The soundness of the system (capacity to negotiate, settlement of disputes) is significantly correlated to the absence of water problems. When water is scarce, the rules and conventions fall apart more quickly.

then to households situated in the vicinity of the water points. The ultimately complex system of *gali* taps demonstrates the usage value of water. But at the same time, and especially when there is no shortage, all the players involved recognize the social value of water, which is not monetarily calculable. This explains the attribution of residual rights to households not having contributed financially. In the same register, the police authorities, the elected representatives and the municipal employees generally justify their indulgence on humanitarian grounds, which is clearly highlighted by Tovey (2002).

Chennai: Expanding needs and growing conflicts with peri-urban users⁸

The Chennai Metropolitan Water Supply and Sewerage Board (Metro Water Board or MWB) takes the sole responsibility of augmenting water supply and sewerage in the city as well as ensuring service provision. It was formed via a legal Act of 1978, and in 1987 the Chennai Metropolitan Groundwater (Regulation) Act entrusted MWB to control abstractions and prioritize public water supply. The city of Chennai suffers from an acute water scarcity, in particular during low rainfall years. MWB supplies less than 50 per cent of the requirement of the city's population, and in an irregular fashion at that (Ruet et al., 2002). Groundwater then plays a crucial role in filling the gap,⁹ as seems to be the case in most Indian cities. (Zérah, 2000). However, the city's groundwater is overexploited: its level has reached an alarming low, and in many places intrusion of seawater has been reported. This has affected its potability as indicated by a battery of indicators (Janakaranjan, 2005).

So far, there has been no solution to overcome water crisis in Chennai. Mega projects (which also involved inter-basin transfers), have been explored but seem too expensive. First and foremost, before launching mega projects, it is absolutely necessary to examine what is locally available. This question is particularly important, because the city's rainfall is quite substantial (over 1,200 millimetres). Despite observed cyclical fluctuations like anywhere else, over the past 100 years, no declining trend in rainfall has been observed. Nonetheless, the city continues to pump increasing amounts of groundwater in the periphery as it expands.

The central role of peripheral groundwater in Chennai's mode of supply

For the past two decades, MWB has relied heavily on the transport of water from public wells and agricultural wells located in peri-urban villages. This impacts both local water tables and living conditions and result in conflicts because of imbalance in the water equity between the city and peri-urban areas. In October 2004, MWB used around 6,000 tanker-trucks of 10, 12 and 20 cubic metres (m³) capacity to carry water throughout the city, in addition to the supply through the piped network. The present supply to Chennai is about 103,000 m³/day. Water is pumped from well fields in Minjur, Panchetti and other places into the system. Plans are also there to rent about 125 field wells around Poondi to pump an additional 30,000 m³/day into the Red Hills water treatment plant. Groundwater extraction from village common lands is not new; in 1969, MWB dug 10 wells in the common lands of a nearby village to solve a water crisis in Chennai and

⁸ Chennai (formerly Madras) is the capital of Tamil Nadu, a south India state.

⁹ Estimates for Delhi are of around 50 per cent.

transported water through pipelines. MWB also compelled farmers of many villages to sell water from their irrigation wells, and many agreed.

It is interesting to note that a large share of this water is actually provided to a small number of industrial users (Gambiez and Lacour, 2003). Yet, to convince reluctant farmers, MWB put forward the needs of the thirsty urban dwellers. In fact, through a rapid cost assessment based upon a study of two villages, Gambiez and Lacour made the point that profits were made by MWB by selling groundwater to these industrial users at a higher rate. Indeed, these industries, especially a cluster located in the north of Chennai, contribute a considerable share of MWB's revenues (Ruet et al., 2002). This highlights the distorted allocative process of water, further leading to intra-urban conflicts. Among the approximately 6,000 private tankers in operation daily during the summer of 2005, not to mention those hired by MWB, the fraction supplying water to the city's residents is decreasing. A number of apartment buildings were prepared to pay the money, but the quality of water was not assured. As industry sources point out, a number of fly-by-night operators, most of them with just one lorry, got into the business, seeking good fast money. But with groundwater levels going down, water quality is suffering. According to industry sources, a 12 m³ tanker of water is on average available for 450–600 rupies (Rs), depending on the area of supply and the periodicity with which water is required.¹⁰

In 2004, MWB paid well owners Rs 3.30 per m³ of water, whereas it charged urban consumers Rs 40 to 50 for the same quantity when supplied through tankers. It is alleged that the huge price difference is due to increasing fuel and transport costs. Prices charged by the private tanker operators are even higher, and can reach Rs 80 per m³. MWB also transports this water bought from farmers through pipelines, which turns out to be cheaper. Altogether, according to official sources, MWB spends around Rs 300 million each year to buy 200 million litres per day (mld) of water from various places. In summer months, the amount is expected to go even higher. For privately operated bottled, purified water, the amount is as high as Rs 50 per 25 litres or Rs 2000 per m³. Rs2 are being charged for 25-centilitre polythene water sachets.

Impact on poverty and livelihoods

From a resource perspective, the existing system looks more like a stop-gap policy. Groundwater is under threat, and there is a consensus to consider Tamil Nadu as one of the worst States in terms of underground resource degradation. Clearly, the way in which urban water needs are met conflicts with environmental sustainability. Notwithstanding this fundamental dimension, we focus here on the socio-economic tensions generated by the overuse of peri-urban groundwater.

In one of the villages affected by this agreement, fieldwork carried out by Gambiez and Lacour (2003) has produced very interesting results. The authors distinguish three types of farmers. The first type owns wells and sells its water to MWB. The second type does not have wells and depends on the former to buy water and irrigate its fields. The third does not give its water to MWB and is not affected by the tripartite agreement. The

¹⁰ US \$1 = 50 Indian Rupees

authors assessed the evolution of agricultural practices and its consequences in terms of income. The results show that the independent farmers, who serve as a reference group, suffered a slight fall in their income due to the reduction of the cultivated area. We can hypothesize that this trend is explained by the growing influence of the city, as can be seen from the transformation of the peri-urban zones: a steady decline of agricultural employment had already been recorded in the last census. On the other hand, for the two other categories the evolution of both cultivated areas and incomes is very marked. Between 2000 and 2001, farmers contracting with MWB reduced their cultivated area by 43 per cent. Out of the approximately thirty farmers selling water, only three, owners of several borings, have maintained their previous level of activity. The others reduced their cultivated area, as the sale of water is much more lucrative than agriculture: their revenue increased by 80 per cent between 1999 and 2002. Dependent farmers were the losers: whereas fifteen farmers supplied water to them before 2001, only two of them have maintained this relationship. This has resulted in a considerable reduction of the irrigated area and, in consequence, a substantial drop in income for the dependent farmers. This arrangement, initiated by a public undertaking, highlights certain crucial issues of urban growth. Following the example of other metropolises (Kundu et al., 2002), the city of Chennai is expanding and developing by imposing new social and environmental costs.

In-depth research carried out by Janakaranjan (2005) substantiates and reinforces the preceding results (see appendix). A comparison of present occupation with the situation 20 years ago in the selected villages, clearly shows that there has been a huge shift from agricultural employment to non-agricultural employment. Similarly, the research also highlights inter-village variations. On the whole, although the worst affected in terms of lack of agricultural activity, one of the villages is doing better mainly because of availability of better alternate employment opportunities. This is correlated with locational advantage (proximity to Chennai) and connectivity factors (the village is on an expressway).

A close look at these conflicts between city requirements and agricultural activities is very important in the Indian context, particularly because of rapid urban expansion. The conventional notion that cities are the engines of development needs much closer examination. After all, there is a vicious cycle: declining agricultural activities and ecological and environmental degradation compels people to migrate to cities; growth of slums and pollution in turn results in stress on urban infrastructure, creating serious problems for drinking water and sanitation. In order to cope with this pressure, cities expand in an unplanned manner, and this process goes on indefinitely (Janakaranjan, 2005).

Inefficiency of regulations

These tensions occur despite a stringent regulatory system, with specific laws designed to curb the over-extraction of groundwater. However, in a sharply polarized political arena, the laws are twisted. The main example is the groundwater legislation in place in Tamil Nadu.

By the mid-1980s, when the available sources of water supply to Chennai started dwindling, a legislation was deemed necessary: the Chennai Metropolitan Area Ground Water (Regulation) Act was passed in 1987. Its main features are as follows: (i) MWB is

entitled to grant or deny permits to sink wells in the designed area, and to grant or deny licenses for extraction, use or transport of ground water, (ii) a database has to be maintained showing the number of wells that were in existence in the area, (iii) no person shall extract or use groundwater in the planned area for any purpose other than domestic uses, and no person shall transport groundwater by means of lorry, trailer or any other goods vehicle.

However, after almost two decades, the Government agency is the main violator of the Act. MWB has been mainly responsible for groundwater overdraft in many peri-urban villages. It draws groundwater from the identified areas but also from surrounding peri-urban areas as far as 50 km away from the city limits, and its lorries run without license. Many private lorry-tankers are also drawing water up to 50 km from the city without any licence. Some of them complain that having applied for a permit or a licence a long time ago, they have not received any, and therefore they break the rule and supply water mostly to industries. As concerns new well/borewell licensing, the procedure exists only on paper. Many industries are not only drawing groundwater in violation of the Act but also degrading the quality of the groundwater. None of them have ever paid any penalty, nor has MWB taken any stringent action against them. A more recent act has also been passed as well as government resolutions. However, loopholes and weakness of implementation remain the same (Geetalakshmi and Janakaranjan, 2005). Indeed, India has a powerful set of legislation, but enforcement remains a major issue. Other conflict resolution mechanisms, such as Public Interest Litigation are not leading to policy implementation.

In the specific case studied here, even though in some cases, villagers are eager to sell water, the tension level between rural and urban interests is high. It can even lead to open conflict (see appendix). But mostly, there is clearly an asymmetry of bargaining power among actors. Local opposition raised by some villagers is not credible enough to stop powerful actors, backed up by the priority given to drinking water by National Water Policy to supplement their water requirements with short term measures.

Is there a way out for peri-urban problems?

The critical question is how to reach the point where one can anticipate a win-win situation, going from conflicts to cooperation. It is not easy to define this path, nor the time frame needed to travel through it. On the one hand, free riders are also politically and economically powerful; this group will lose if cooperation is attained. On the other hand, present losers are vulnerable and therefore fatalists; this group would be willing and more than happy to participate in dialogue and reach the level of cooperation, but can it speak up? Precisely for these reasons, it is not going to be easy to involve these diverse groups in a meaningful dialogue until one reaches a *threshold level of crisis*; but this does not mean that one should not start the dialogue process beforehand. This is precisely where multi-stakeholders platform (MSP) and multi-stakeholders dialogue (MSD) play a key role (Janakaranjan, 2005a).

MSP and MSD are important tools for achieving sustainable development anywhere individual rationality is in contradiction with collective rationality. While initiating a MSD process, it is important to remember that dialogue is not a one-off phenomenon: it is a process, and it is time-consuming. A facilitator should not work with a finite time frame

and should have patience, be sufficiently motivated and be emotionally stable, in addition to having access to resources. And most of all, a MSD initiative will be successful only with the support of a democratically elected government.

MSD experience in Chennai and peri-urban water conflicts

Field research, followed by stakeholder analysis and then multi-stakeholder dialogue process was initiated in Chennai's peri-urban area. A survey of sixty-four villages in different segments of the city's peri-urban area helped not only to collect data and document ongoing conflicts, but also to build contacts with various stakeholders within villages. Finally, the MSD process was initiated on negotiating and finding solutions to the city and peri-urban water conflicts.

Several local multi-stakeholder meetings were held from July 2004 to February 2005, which were attended by researchers, NGOs, farmers from peri-urban villages and some government officials. Subsequently, after completing the meso-level survey in sixty-four villages, two regional stakeholder workshops were held. These helped to build both knowledge of the situation and contacts. One of the main goals of the project was to develop an MSD process. Furthermore, the regional meetings have helped to understand more about the socio-economic and political status of peri-urban stakeholders and the extent of water transport and its implications on livelihood.

As soon as September 2004, a Round Table was organized in Chennai to set up a 65-member multi-stakeholder committee of water users from urban and peri-urban areas: farmers from peri-urban villages (both water sellers and non-water sellers), landless agricultural labourers, women self-help groups, NGOs, researchers, lawyers, urban water consumers and a few government officials. It was decided to include more members in the committee later. The first Committee meeting was held on 26 November 2004 in Chennai with full active participation of all members. Invited government officials came but refused to talk. The Committee met again on 4 February, 2005. It addressed several key issues, such as declining groundwater levels, declining agricultural activities, emerging serious livelihood problems, seawater intrusion, deteriorating water quality problems, water and soil pollution, drinking problems, sand mining and people's growing unrest. The Committee agreed to work on the specific agenda within a given period and came up with new ideas.

Alternative solutions to Chennai water problems

It was agreed to first consider the availability of water resources from within the city. There are at least seventy temple tanks and ponds located in different parts of the city, which used to get filled during monsoon months. Now most of them are silted up, and supply channels have disappeared due to civil construction. One should restore all these tanks to their original condition and re-capture rain and flood water during monsoon months. The simplest way would be to link storm water drains with these tanks; otherwise, huge amount of floodwater will wastefully flow into sewage drains or into the city's polluted rivers. This particular measure would not cost much compared what is spent on big projects. The potential benefits and costs are remarkable and need to be scientifically assessed.

Second, the city generates about 700,000 m³/day of sewage, which is under-utilized. Only around 100,000 to 150,000 m³/day is supplied after primary treatment for industrial use by Chennai Petroleum and a fertilizer company called MFL. The rest is discharged into the city's rivers, either untreated or after primary treatment. There is a scope for recycling this water even for some domestic uses. At least 80 per cent of the sewage can be recovered and recycled; sludge has a very good commercial value and could be used as bio-manure after proper treatment. This means at least 500,000 m³/day of water can be retrieved and supplied to the population, representing 70 per cent of the city's domestic water requirements. Environmental engineering experts point out that the cost of tertiary sewage treatment is cheaper than seawater desalination.

Third, according to old records, in the peri-urban areas around Chennai, there are 3,600 tanks (in Tiruvallur and Kancheepuram, adjoining districts of Chennai) that are at present only partially used for agriculture. Many farmers have left their villages, or land has been sold out for urban use. These tanks are mostly silted and encroached. There is an urgent need to revamp them, restore inlet channels, desilt them, strengthen bunds and restore water supply during monsoon months. In other words, rainwater should be harvested in these tanks, if only to reduce farmers' unrest in peri-urban villages: the steady decline of the water table causes seawater intrusion in several villages close to the coast. If tanks are restored, groundwater levels in these villages will improve considerably; which will ensure better livelihoods through rejuvenated (and peri-urban) agriculture. Surplus water can be diverted to help meet Chennai's requirements. This is a clear win-win situation in contrast to the present arrangement, where city benefits only on the short term and peri-urban areas consistently lose out.

Fourth, new check dams in Araniar and Kosathaliar would help save more rain water. And, finally, water treatment and supply should be decentralized in order to cover both city and peri-urban areas more effectively and efficiently.

These proposals must be checked with additional research: a survey of all water bodies in and around the city, an economic study of wastewater recycling, and feasibility studies of check dams. This phase would necessarily require the State's cooperation, in particular the support of agencies such as MWB, Tamilnadu Water Supply and Drainage Board (TWAD board), farmers associations, NGOs etc. The MSD process points out the necessity of these measures, but we need to think seriously about how to implement them, within which time frame, with which community implication and with what public funding.

Conclusions

It should be stressed that a rationed water supply and an often inefficient service in the cities, together with the disregard of formal rules (that are moreover vague), lead various users to a 'pumping race' and over-exploitation of the resource, through either individual or joint initiatives. All these decentralized solutions have a fairly high cost, despite water being apparently free. Presently unsustainable, they have a potential for improvement, subject to several conditions.

One concerns the institutionalization of community participation mechanisms. They are welcome for at least three reasons: it would help to internalize costs and facilitate the

organization of a system of transparent redistribution; residents would actually be able to ensure the up-keep of the decentralized installations; it would facilitate a more effective management of the resource through the detection of leaks and better demand management. Finally, the rights of access would be better ensured. This requires considerable institutional improvements, and in particular setting up consultation, negotiation and, above all, regulation mechanisms.

Private markets for the resale of water are not sustainable in the long term, given the present state of affairs. The lax regulatory framework offers private operators, an opportunity to supply a private commodity at an excessive price without any guarantees of quality. Only can the most affluent households take advantage of this service, which ultimately contributes to the segmentation of the different categories of the population. These are provisional solutions that do not really meet the overall requirements of urban management, nor of the resource. They reduce the scope for territorial equalization systems or any other unifying mechanism specific to a public service monopoly.

These modes of organization reveal the incapacity of the institutional environment to stop agents from carrying on, as most of the rules can be bypassed. In return, they cannot evolve much, being tuned to major malfunction and growing discontent. Each of the system's factors is governed by its internal dynamics, without clear interaction with others, which emphasizes the magnitude of the institutional deadlock. Thus we have a situation of tacit *laissez-faire*, which contributes to the depletion of the resource and the degradation of the infrastructures.

The role of the institutional environment is, among others, to lay down the rules enabling transactions to take place and at a lower cost, i.e. to ensure the transfer of rights that accompanies these transactions. In most Indian cities, several problems combine to exacerbate the bad management of water and infrastructures: poor coordination between various agencies, both vertically and horizontally, which results in erratic planning; political instability, which constitutes a permanent threat, holding the public hostage; the problem of corruption; and the judicial system, independent but overworked and unable to enforce the rules.

All these problems are, of course, very difficult to resolve, and we can only indicate the goals that should be kept in view. This confers a very normative character to our propositions. The first goal should be the simplification of the institutional framework by redefining responsibilities in order to better coordinate the various decision levels, avoid the overlapping of tasks and limit the intervention capacity of discretionary powers. The second stresses the concept of a democratic decision-making process in which all the interest groups in the system would be represented (from the infra-local level to that of the whole area), which would act like a broad-based regulatory framework. Lastly, we consider it essential to redefine the constituents of the public service and its articulation in operational terms. This implies a reversal of the perspective, in the sense that the service should not be conceived in a technocratic top-down manner by imposing arbitrary norms, but rather in terms of the fundamental needs that should be met, taking into account the different systemic effects.

Appendix: Water conflicts in two peri-urban villages of Chennai city

Palayaseevaram Village

This village is located 50 km away from Chennai on the National Highway. Its population is 5,285 (2001 census). The village has witnessed a sharp increase in land value.

Main irrigation surface sources and their command areas

A series of tanks, spring channels; 5 *kulams* (small tanks used by villagers for non-irrigation purposes, such as washing, etc.) and 4 *kuttais* (ponds used for washing cattle)

Wells

In 1980, there were 71 wells with depths in the range of 24 to 27 feet. Now there are 150 wells with a depth in the range of 60 to 100 feet; 50 are bore wells and the rest are open wells. At present only 20 wells are in use. Quality of water is reduced as water table dropped.

Drinking water

In 1990 drinking water was supplied for 5 hours per day vs only 1 hour per day in 2002.

Background to conflicts

Original plan was to pump water from Palar River bed to supply to the adjoining areas of Chennai city. The estimated demand for this region was 22.5 mld in 1979. It has at least doubled since then.

The people of Palayaseevaram village opposed this move on the grounds that it would affect groundwater availability. A memorandum was submitted to the District Collector. The matter was taken to the then Chief Minister, who took a decision in favour of the city and against the village population. The CM sought the support of the village people, who eventually gave their consent to pump and transport the Palar water. The work was executed.

Originally in 1972, the TWAD Board dug 5 wells in the Palar bed. These wells are collection points of water in the riverbed. For the past 5 years, supply of water in these wells has been reduced drastically, and 6 more wells were then dug in 2004 on the other bank of the river. The main reason for decreasing availability in these wells is substantial and illegal sand mining in the riverbed, much beyond permissible limits. This has drastically reduced the water withholding capacity of the riverbed aquifer and groundwater availability in the village, even for drinking. Agriculture is badly affected by the water scarcity

In the entire stretch in this region, groundwater was pumped in the years 2003-04 to supply water to the city; water was transported by MWB through tanker-trucks. Everyday, at least 2,500 loads were sold from these areas (1 load = 12,000 litres). This has also affected groundwater supply in the Palayaseevaram village

A sugar mill was built in the year 1987 despite opposition from the village. It discharges a good deal of untreated effluents into a tank that is supposed to irrigate 423 acres. The sugar factory has not only occupied and purchased land irrigated by the spring channel, the mill has also blocked the water flow which eventually was supplying water to the Al Kondan tank.

Outbreak of Conflicts

MWB wanted farmers to sell water from their irrigation wells, and many farmers in the region agreed. But as concerns Palayaseevaram village, the TWAD Board objected to this proposal, claiming first-in-time rights, with 12 wells of their own. Therefore, the farmers of this village were requested not to sell water. Only one sold water for one month.

How was the conflict represented?

Several petitions and memorandums were sent to the government; NGOs organized a series of demonstrations and issued public notices. They also organized a public hearing on the issue of illegal sand mining in Chennai, which attracted considerable attention from the civil society and the media. Lawyers condemned the illegal sand mining and suggested that the Government appoint a Committee to go into the details of damage done to the river and suggest ways to protect it.

Mediatory/legal process: None

Outcome of conflicts: None

Present status

Passive struggle: people are absorbing the shock created by water depletion or leaving the village for urban employment. Many have sold their lands (growing absentee landlords) and many more are planning to sell land. The village is located on the main corridor linked to Chennai

Sand mining, like sugar mills, is a lucrative activity and has a powerful lobby with political connections and threatens local people. There is both growth of non-farm employment, and unavailability of farm labourers who find more gainful employment in non-farm activities.

Responses

The responses from media and civil society are encouraging, but the political parties are seemingly not interested in this issue, and the village's population does not mobilize itself.

Velliyur Village

This village is located at a distance of 50 km from Chennai city with a total population of 4,379. Very high increase of land value.

Main surface irrigation sources and their command areas

There are 2 Tanks, 2 *Kulams* and 1 *kuttai*.

Wells

In 1980, there were 280 wells with depths in the range of 50-80 feet. Now there are 220 wells and the depth is in the range of 130-160 feet. Quality of water is bad compared to 10 years ago. Until the mid-1960s, there existed only dug wells; borewells have become common after the introduction of HYV technology in the region. Since 1990, dug wells have become literally useless; at least 60 dug wells are abandoned.

Drinking water

In 2000, drinking water was supplied round the clock from 4 bore wells. In 2004 it was supplied only 2 hours per day from a total of 12 bore wells.

Background to conflicts

In 1969, 11 bore wells were installed to pump water from the common land of the village in order to provide additional water to Chennai city and supply nearby industries. The estimated water supplied from this village was 16 mld in 1969. In 2000, out of the 11 bore wells, 9 had failed; since then, water has been purchased from farmers.

In the village, farmers sell water (40 mld) from a total of 75 wells, but out of these, only 55 were working in the year 2004. Furthermore, the TWAD Board was planning to install 7 more bore wells in the common lands of Velliyur in order to supply water to Thiruvallur town; but due to farmers' resistance, only 4 were actually commissioned.

Groundwater availability considerably shrunk in the village, even for drinking. Agriculture has been badly affected by water scarcity. Water sales from 75 irrigation schemes belonging to individual farmers made things worse; landless labourers were forced to migrate; extensive and intensive sand mining activities also drastically reduced water yields in wells. The TWAD board project which triggered-off conflicts.

Narration of conflict

The people of Velliyur village had remained quite passive for more than 3 decades. However, when groundwater table decreased progressively, farmers had to spend substantial amounts on deepening activities. This prompted the NGO that worked in the area to motivate the Self Help Groups (SHGs) and other landless population. Subsequently, SHGs started to oppose water sales in April 1995. SHGs insisted that the Panchayat should pass a resolution banning water sales from Velliyur village, but the Panchayat did not do so since groundwater is pumped only from Government land. Since 2000, water is purchased from the farmers, which has led to severe water crises, impacting on agriculture and creating serious livelihood problems in the village. This was precisely the reason why SHGs and the SC, ST population of the village prompted by the local NGO got themselves organized to oppose water sales and pressed for passing a resolution in the Panchayat against water sales again. This time also, the Panchayat refused to pass a resolution on the grounds that it is individual farmers who sell water from their own land. Since the property rights on groundwater are undefined nothing much could be done.

Some of the village residents filed a case in the court to ban water sales from the village. They were successful in getting standing in court, but soon it was vacated through an appeal petition filed by a water-seller supported by MWB. Under such duress, in the year 2003, almost all the agricultural land was left uncultivated, and the labourers migrated in search of employment.

Meanwhile, there was sand mining by the government from the river Kosathaliyar, which drastically reduced the groundwater table. The farmers who were selling water took the sand mining issue to the Metro water and informed them that water sales would be stopped if sand mining was allowed. Metro water took the issue to the government and stopped sand mining. So the labourers who were working in sand mining were affected and started opposing water sales severely. The conflict was tense between the sellers and non-sellers and finally broke out in August 2004. The entire village, apart from the sellers, asked the Panchayat to pass a resolution to ban water sales and resorted to road blockages. The Metro water officials, RDO, Thasildar and some other officials arrived at the scene and tried to solve the issue. Since the entire village was against water sales, a peace committee was formed consisting of water-sellers, non-sellers, SHGs and officials. During the peace committee meeting, it was decided to stop the water sales from farmers to MWB after 15 September 2004. Everyone including the MW officials, sellers, non-sellers and all other villagers agreed to abide by this decision. After the peace committee decision, the entire issue was put into cold storage until 14 September 2004. On 15 September, MW officials reported that water purchases would not be stopped, since their own higher authorities did not accept the agreement reached at the Peace Committee meeting. Water-sellers were also willing to sell water. In the meantime, water sellers tried to sway the court and obtain stay from the court against the decision taken during the peace committee meeting. Since the non-sellers had a doubt that the sellers might seek legal protection, they also moved the court to get a stay on water sales. It was an unsuccessful move for both sellers and non-sellers. On the evening of 15 September 2004, a notice was issued to the villagers by the sellers stating that the non-sellers who were objecting to the sales are rich and were trying to fool the poor people, and that they had encroached upon the common lands and were cultivating land that could have been given to the poor people if the non-sellers had real concern for the poor. This notice had no effect.

Since water pumping was not stopped by 16 September 2004, the entire village was gathered near the sump from which water was pumped. The road was blocked. Though the officials (including the RDO, Thasildar and MW engineers) arrived, they did not agree to stop water purchases. At this point in time, some people from the agitating group broke the pipeline structures which belonged to MWB. After this violent protest from people, the police arrested 47 people belonging to Velliyur and filed a FIR. They were booked under the Public Property Damaging Act. MWB requested the court to order Rs.30,000 in damages towards compensation for breaking their infrastructure. The court also instructed the arrested farmers to pay the compensation. They were released on bail, and the case is pending.

Present status

Water selling was stopped. Again MW officials are asking farmers to sell water, and some of them are willing to sell. MW has posted a notice and even circulated it among the farmers, stating that whoever is willing to sell water can approach the MW to have an agreement for one year and that the tender should be submitted before 22 February 2005. But to date, water sales have not started.

Responses

The responses from media and civil society and the political parties are encouraging. The present MP (DMK) of the Sriperumbudur constituency visited the village and asked the police to release the arrested persons immediately, stating that the public has the right to question and that the government had failed to keep the promises made in the peace committee meetings, which compelled the people to resort to such violent reactions.

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Conflicts over water supply in Jakarta, Indonesia

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Introduction: Watering Jakarta

In contrast to many other Asian cities, Jakarta has relatively little water supply and waste-water disposal infrastructure and is characterized by lower rates of urban services provision than other national capitals. The World Bank characterizes its water and sanitation sector as one of the weakest in Asia (Brennan and Richardson, 1989; Leitmann, 1995; McGranahan et al., 2001; World Bank, 2004). The official (generous) estimate is that 56 per cent of the city's residents are connected to the network (Jakarta Water Supply Regulatory Body, 2004).¹ The water delivered through the network is not potable; medical studies repeatedly find faecal coliform contamination, and residents are advised to boil their water.

In a strategy openly backed by international financial institutions, the Indonesian government has adopted a twinned strategy to improve the water supply sector: private sector participation and water law reform. Government support for private sector involvement in the water supply sector has been articulated as a means of attracting increased private investment and increasing connections for the urban poor. In addition, the government has enacted broad-based market-oriented water sector reform, including the controversial new Water Law (supported by the World Bank as conditionality for refinancing) establishing tradable water rights and redefining water as an economic good

¹ Figure calculated using 2002 data from annual reports of the two private concessionaires operating in Jakarta. This was cross-referenced with ADB (2003b), which reports a figure of 51.2 percent. Coverage ratios should be understood as rough estimates; their calculation is dependent upon a number of variables that are only imprecisely measured, such as urban population and average household size. Reported figures vary significantly and do not indicate the number of households that have a connection but rely primarily on other sources (e.g. groundwater) due to quality or service concerns (e.g. low pressure).

(Jakarta Post, 2003; World Bank, 1999; 2004b; 2005). NGOs and civil society groups have launched campaigns and court cases against the new Water Law, arguing that water is a human right. Advocates of water supply – notably many government officials – insist that the (foreign) private sector is the only reliable source of expertise and finance. They contend that water is a service like any other, which requires rationalization and efficient management and support the commodification of water implied by the new law. These developments are in line with the evolution of governance frameworks internationally over the past two decades, in which state authority has been increasingly delegated to non-state (usually private sector) actors (Pierre, 1995; 2000; Rogers and Hall, 2003). This is characteristic of neoliberal framings of solutions to environmental problems (for recent critiques of neoliberal approaches to water, see Bakker, 2005; Goldman, 2005; Haughton, 2002; McDonald and Ruiters, 2005; and Swyngedouw, 2005).

As discussed in the following sections of this paper, a number of other conflicts have arisen over water supply in Jakarta: social, economic, and environmental. The private sector participation contract signed in 1998 has been an important source of conflict, actively contested by NGOs and consumers. Conflict has arisen between the private company, the municipal government and the regulator over water prices and tariffs. Labour unrest, due to conflicts between water industry workers and the two private concessionaires, has also flared up. Underlying these conflicts is a severe environmental inequity, in terms of access to clean, potable water for the city's residents.

Going Private: Conflict over the water supply concession contract for the City of Jakarta

Proponents of private sector participation (PSP) in water supply have argued that PSP is a means of improving service delivery to the poor (see, for example, Cross and Morel, 2005; Nickson and Franceys, 2003),² critical in a world in which an estimated one billion people – the 'unserved' in development jargon – lack access to safe, sufficient water supplies (WHO, 2000). Specifically, through efficiency gains, improved management, and better access to finance than public utilities, private companies improve performance (including cost recovery rates) and increase access through extending networks and providing new connections to previously 'unserved' customers. This benefits the poor, particularly in urban areas, who are often served by a variety of informal arrangements, such as water vendors, and typically pay much higher prices per unit volume for poorer quality water than wealthier consumers (Johnstone and Wood, 2001; Shirley, 2002; World Bank, 1994; 1997; 2004a).

Opponents of private sector participation argue that PSPs are not reliable mechanisms to supply water services to the poor, because private companies are unable to supply the poor on profitable terms. As proof, critics point to the withdrawal of the private sector from contracts and regions of the world, in light of risk-return ratios that have remained

² See, for example, the Global Water Partnership (<http://www.gwpforum.org/>) and the World Water Council (<http://www.worldwatercouncil.org/>), two influential networks of private water companies, governments and lending agencies. The Business Partners for Development links the World Bank with private water companies and governments, and 'aims to produce solid evidence of the positive impact' of PSPs (<http://www.bpdweb.org>).

unacceptably high (Hukka and Katko, 2003; Smith, 2002),³ in part because of the low ‘ability to pay’ of poor consumers. Moreover, some critics argue that the potential contributions and sustainability of private sector involvement will be undermined by political conflict and civil society resistance to PSPs arising from the belief that water is a human right. Indeed, mobilization of social movements in opposition to PSPs has occurred in many countries, at times resulting in the cancellation of contracts by governments (e.g. La Paz and Cochabamba, Bolivia). In other cases, such as Manila, the opposition of social movements has factored into the decision of the private company to withdraw (Barlow and Clarke, 2002; McDonald and Ruiters, 2005; Shiva, 2002; Trawick, 2003; Swyngedouw, 2005; Wateraid, 2003). Many of these critics argue that PSPs are not ethically appropriate, and call for the management of water as a commons, often with reference to idealized models of indigenous water governance. Even where critics agree in principle to the management of water by the private sector, they argue that political conflict over the socio-economic identity of water will further elevate risks and decrease the likelihood of the private sector being able to supply the poor on a profitable basis.

The private sector participation contract in Jakarta

These debates between proponents and opponents of private sector involvement have been acute in Jakarta. The private sector participation contract signed in 1998 with two international operators promised to improve water quality, mobilize international finance for network expansion and thereby improve and increase access to water supply for Jakarta residents – particularly the poor. As documented in this section, however, key original performance targets have been dramatically scaled back, and new connections have not been pro-poor. Tariff pricing (with lower tariff bands below marginal costs), decided by the municipal government in negotiation with concessionaires, is implicitly ‘anti-poor’, providing a disincentive to both the municipality and the private concessionaires to connect the poor. The physical layout of the network, which is spatially concentrated in wealthier areas of the city – a legacy of public sector management – is an additional barrier to connecting the poor.

Moreover, poor users have multiple disincentives to connect to the network. Total costs of networked water supply may be higher than alternative sources (such as groundwater or water bought from vendors). Other disincentives include insecure tenure, the need for flexibility of payment, convenience, status and high ‘transaction costs’ associated with dealing with the formal water utilities. ‘Transaction costs’ – infrastructure costs to build storage because networked water supply is only intermittent; line-ups and time off work to pay bills (for those without bank accounts and regular income); fear of time required to deal with mis-read meters and over-charging – are other disincentives.

Jakarta’s government exhibited a heightened interest in the urban environment and services provision in the 1990s, as typified by the then-governor’s favourite slogan for

³ For academic studies critical of the privatization process with a focus on developing countries, see the Municipal Services Project website (<http://qsilver.queensu.ca/~mspadmin>). For an international public sector union perspective, see the very comprehensive PSIRU website (<http://www.psiru.org>). For a campaigning NGO perspective, see the Council of Canadians Blue Planet Project (<http://www.canadians.org/blueplanet/index2.html>) and the US-based Public Citizen’s campaign on water supply (<http://www.citizen.org/cmep/Water/>).

Jakarta: *'Bersih, Manusiawi, Wibawa'* (Clean, Humane, Powerful) (Leaf, 1996). Concerns about the poor level of service in the water sector had persisted for decades, and water shortages and water quality problems were perceived to be increasingly acute (Berry, 1982; Lovei and Whittington, 1993; Gilbert and James, 1994; Indonesia Times, 1996). One response (in Jakarta as in other Indonesian cities) was limited private sector participation: out-sourcing of routine repairs, billing and payment collection by Jakarta's water supply utility, PAM Jaya (Mandaung, 2001). Water supply was one of many PSP initiatives ongoing in the country; the Indonesian government had passed legislation enabling private sector participation and privatization for most public sector utilities in the mid-1990s, and had embarked on private ventures in various sectors over the past decade, for example privately funded toll highways throughout the greater Jakarta area.⁴

Discussions regarding a long-term PSP concession contract with foreign firms began in the mid-1990s. International water companies were keenly interested in entering the water services market in Indonesia, as a large, middle-income country with an expanding middle class and relatively low penetration of networked water supply services. After protracted negotiations, 'cooperation agreements' for the management and expansion of Jakarta's water supply system were awarded in late 1997 to two of the largest water services companies⁵ in the world: (British) Thames Water International and (French) Ondeo (Suez-Lyonnaise des Eaux). The process of awarding the contract for Jakarta's water supply was characterized by what the political science literature defines as 'collusive corruption', where government and private sector officials collude to deprive the government of revenues (Bardhan, 1997; Shleifer and Vishny, 1993). This occurred instead of a public tendering process, where international water companies put forward unsolicited proposals directly to the government. Under then-President Suharto, partnership with an Indonesian firm was a prerequisite for international corporations hoping to take over the operations of a utility network. This is not unusual in the international water supply sector, in which private sector consortia typically have local minority shareholders. In the case of Indonesia, however, these private sector consortia were frequently linked directly to the President. By the early 1990s, the large Indonesian conglomerates had 'already [become] active within other public service areas, and these groups expected to benefit from the privatization of water services' (Baye, 1997). The two international firms were partnered with two local private firms, respectively members of two of the most important conglomerates in Indonesia: Salim Group (run by Bob Hassan, a crony of then-President Suharto) and Sigit Group (run by Sigit Harjojudanto, Suharto's eldest son).⁶

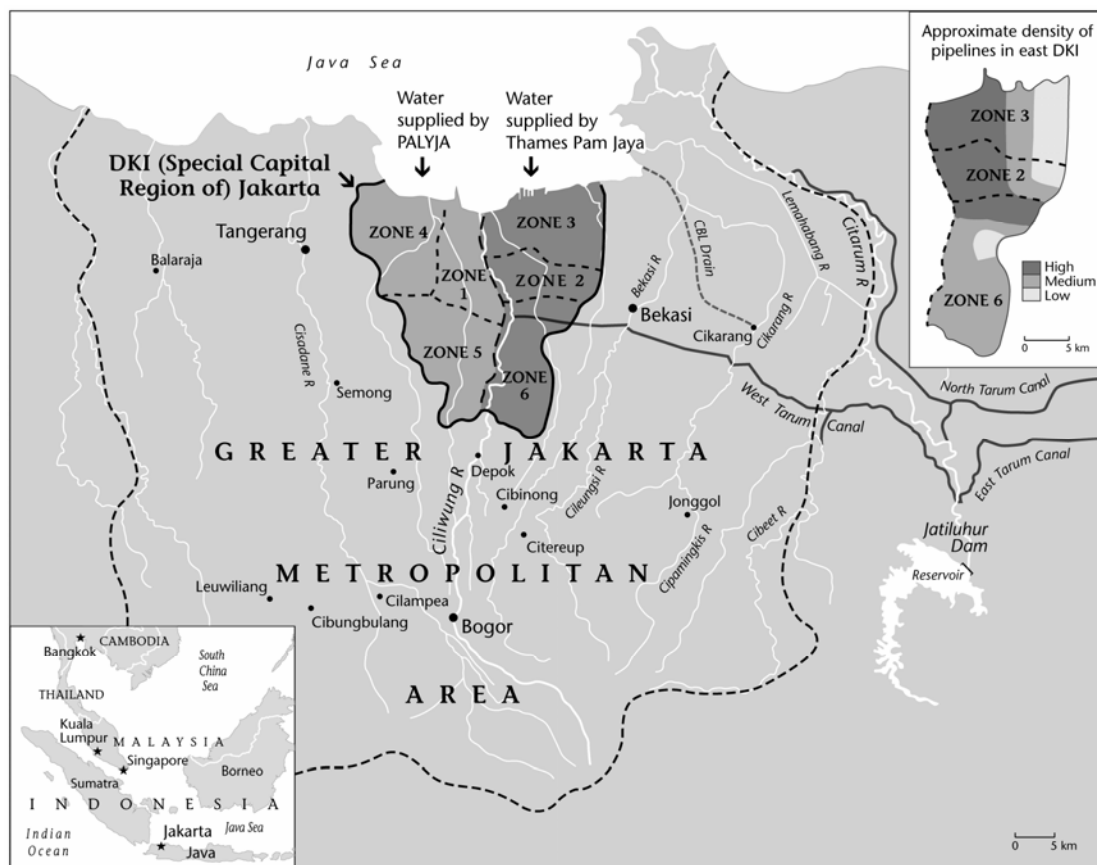
⁴ Private sector participation contracts in water supply have been signed in several other Indonesian cities: Bali, Batam, Medan, Lhok Seumawe, Sidoarjo and Pekanbaru (Baye, 1997; ADB, 2003).

⁵ Sanitation services were not included in the contract and remain the responsibility of the various municipalities that make up the greater Jakarta area.

⁶ Corruption in Indonesia is internationally recognized as being particularly pervasive (Transparency International). 'Market consumption' and 'parochial consumption', where the latter hinges on kinship, caste, etc. and the former on wealth, (Scott, 1969) were conflated in a system that came to be known in Indonesia by the triad of 'Corruption, Collusion, Nepotism' popularized as an acronym (*Korupsi, Kolusi dan Nepotisme* or KKN) which came to symbolize the Suharto regime (Robertson-Snape, 1999). That the contracts were awarded despite national laws prohibiting foreign investment in drinking water delivery (Law No. 1/1967; Ministry of Home Affairs Decision No. 3/1990) and local regulations (No. 11/1992 and

In January 1998, each consortium signed a 25-year contract with PAM Jaya, the municipal water supplier in Jakarta, which retained ownership of the water supply assets. The private consortia were to be responsible for the operation of the water supply system, including the administration of the customer database and billing. Thames' contract allocated the local partnership, Thames PAM Jaya (TPJ), the exclusive right to operate and manage the existing water supply system in the eastern half of the city,⁷ supplying 2 million people connected to the supply system out of a potential customer base of 5 million. Simultaneously, Lyonnaise des Eaux's subsidiary, Palyja, was given a contract to supply the western half of the city (see Figure 1), covering a slightly larger number of potential customers. Ambitious targets were set: the private companies committed to reaching universal coverage by 2023 and to supply potable water to consumer by 2007.

Figure 1: Water Supply in Jakarta



No. 11/1993) precluding private sector involvement in community drinking water supply was to be a source of conflict in the early years of the contract (Argo and Firman, 2001).

⁷ Indonesia Times. 1998. Privatised water supply begins soon, 16 January, p. 3.

The contracts were expected to be lucrative for both the local and international partners. Under the terms of the contract, this profit was not to be linked directly to the revenues of the municipal water supply system. Instead, each consortium was to receive a fee on the basis of volume of water supplied and billed, *not* on the basis of the water tariff (set by the municipality) or the percentage of cost recovery. With no direct equity stake, and with profit de-linked from cost-recovery rates, the international water companies thus sought to minimize the risk inherent in cost-recovery. An additional safeguard was built into the payment mechanism: an indexation formula, linked to the rupiah-US dollar exchange rate and the (Indonesian) inflation rate was built into the ‘water charge’ formula used to determine payments made to the private operators – who are paid according to unit volume of water delivered to the distribution network, rather than billing revenue. Cost recovery and currency risks, in other words, were to be borne by the local government.

Re-regulation: Tariffs, profits, and conflictual re-negotiation of the contract

The political and economic turmoil that unfolded in Indonesia in 1998 vitiated these strategies. Riots, the resignation of Suharto, and the abrupt and dramatic devaluation of the Indonesian rupiah⁸ threw the country into a period of chaos. After a tense interlude in which senior expatriate managers of the private concessionaires fled the country, local managers cancelled the PSP contracts, and senior British and French executives and diplomats pressured the federal government to have the contracts reinstated, the private concessionaires resumed operations (having discreetly abandoned their Indonesian partners, now tainted by their association with ex-President Suharto) (Harsono, 2005).

Confronted with public protest over rising prices of staple food items and gasoline, the municipal government refused to raise tariffs to compensate for the devaluation of the rupiah (Rp). In theory, his delay in tariff increases should not have posed any difficulties for the private water companies, as revenues are determined by a ‘water charge’ paid per unit volume of water delivered into the network. This means that revenue of the private operators is not linked to amounts billed or collected from consumers. In other words, the revenue of the private concessionaires is, in theory, independent of cost-recovery as well as tariffs. Indexing the water charge to the rupiah-US dollar exchange rate provided protection against currency devaluation; should the rupiah fall in value, the water charge (expressed in rupiah), would rise accordingly.

The limitations of this strategy were revealed when receipts in dollar terms plummeted from 1998 onwards. Given the political unrest in Jakarta, the Governor was unwilling to implement agreed-upon tariff increases. The gap between the water charge required for compensating the private companies and the average water tariff increased dramatically. Whereas the water charge paid to the private operators was 11 per cent *below* the average tariff in 1997, it rose to over 60 per cent *above* the average tariff in early 2001. Subsequent tariff increases did not raise the tariff above the water charge until early 2004 (Jakarta Water Supply Regulatory Body, 2004). The result was that the amount charged by the private concessionaires – via the water charge – to the government increased dramatically, while revenue fell just as dramatically. PAM Jaya (and thus the local

⁸ From approximately 2,300 Rupiah/US \$1 in 1997 to 10,000 Rupiah/US \$1 in 1998.

government) bore the risk for the revenue shortfall, and became increasingly indebted to the private companies. The cumulative deficit by the end of 2001 was Rp 469 billion (approximately US \$46 million) and had reached Rp 990 billion (approximately US \$97 million) by September 2003 – excluding late payment interest and retroactive tariff increases (Jakarta Water Supply Regulatory Body, 2005).

The time period for repayment of this debt by PAM Jaya is likely to be protracted. With the fall in the value of the rupiah, its operating revenues fell approximately four-fold in dollar terms. PAM Jaya's revenue can be expected to be on the order of Rp 400 billion per year (approximately 5 per cent of the outstanding 'debt'). The negotiated annual tariff increases are likely to be less than 10 percent. Thus, although tariffs were raised and will continue to increase, these increases will not generate sufficient revenue to quickly repay the 'shortfall'. By mid-2001, the prospect of slow repayment of the still increasing 'debt' provoked a renegotiation of the contract, transforming it into a management contract – with a guaranteed internal rate of return of 22 per cent – rather than the original concession agreement.⁹ Technical targets have been dramatically scaled back (see Table 1); most notably, the commitment to provide potable water supply at the point of consumption was dropped.

Water workers united: labour-led protests and unrest

Prior to the initiation of the concession contract, employment at PAM Jaya fluctuated between 1,100 and 1,200 full-time (equivalent) employees. The cooperation agreement signed in 1997 between PAM Jaya and the private operators allowed for the secondment of employees to help TPJ and Palyja run water facilities on the production and distribution side. Of these, between 800 and 900 employees were permanent and on direct contract, with the remaining 200 to 300 on yearly contracts. Secondment arrangement like this one are quite common in PSP contracts in developing countries; local employees retain their jobs while the (often foreign) concessionaire obtains required local expertise and language skills.

The secondment arrangement has given rise to concerns on the part of employees with respect to their status and benefits. PAM Jaya is a municipally owned company,¹⁰ subject to the relatively restrictive labour legislation applying to the public sector. Confronted with what a perceived surplus of employees (relatively frequent in public utilities in developing countries), and prevented from firing those who remained nominally civil service employees, TPJ and Palyja re-assigned staff to PAM Jaya, while complaining to the municipality of the rigidity of the labour laws and weak sanctions available to the private concessionaires against poor performance. The civil service employees, on the other hand, resented being excluded from day-to-day operations, particularly as new private sector employees – with higher salaries and sometimes benefits like company cars – were hired directly by the private concessionaires. By mid-May 2000, labour relations had degenerated significantly; ten of fourteen offices were vandalised by employees, who

⁹ As with many such contracts, profits are 'backloaded'. The Internal Rate of Return is calculated over the lifetime of the contract and is, to date, negative.

¹⁰ The formal category is BUMD (*Badan Usaha Milik Daerah*) which loosely translates as a 'local state-owned company', the owner in this case being the municipality.

refused to work and instead vandalized offices, took operational computers and threatened employees who decided to continue working.¹¹ Some office doors were even welded shut, as the union demanded cancellation of the contract. Employee protests continued throughout 2000.¹² Company managers accused workers of acting to protect lucrative and corrupt practices entrenched in PAM Jaya's billing and subcontracting practices; these accusations were countered by accusations of corruption on the part of the foreign water companies in tendering and, of course, the original bidding process. In the context of endemic corruption in Indonesia with recognized effects on urban management (see, for example, Server, 1996), these unproven allegations were mutually damaging yet unsurprising.

Prior to Suharto's eventual departure, labour relations were worsening and the political situation in the country was deteriorating. Widespread political unrest led the expatriate staff to flee the country, and the municipality declared that the contract had been cancelled. Against the backdrop of political unrest and the generalized backlash against foreigners, protests by the local water company staff grew increasingly vehement. Protest peaked in 2000, with union members demanding cancellation of the contract, staging public protests, physically closing neighbourhood kiosks and company offices, and even welding the doors of company offices shut. The municipal government's adoption of a middle-ground position, refusing to raise water tariffs (despite a contractual obligation to do so) while also refusing to cancel the contract, was a key factor in dampening union protests. Although work slowdowns were still in place in 2001, strikes action had tapered off. The union continues to attempt to undermine the water companies by using 'weapons of the weak', to use Scott's term (1969), disseminating information that counters the claims of the water supply concessionaires regarding investment, performance and profit.

Connecting the poor? Conflict over tariffs and pricing

Implicit in the original target of 100 per cent service coverage and explicit in public justifications of the PSP contracts, was the belief that private sector participation in water supply would lead to a higher rate of connection of poor households. Service coverage has increased since 1998, but the distribution of new connections has not been 'pro-poor', if this is defined as a rate of connection equal or greater to the percentage of poor in the urban population. This has led to an increase in consumer protest, including court challenges brought against the municipal water utility (highly unusual in a society that was characterized, until the fall of Suharto, by an authoritarian style of governance in which consumers' rights were not articulated through the legal system).

An important goal of the original concession agreement was the extension of the network and increase in coverage, for which targets were specified in the original contracts. By 2002, however, service coverage for both concession areas remained just above 50 per cent, well below the 70 per cent target specified for 2002 in the initial contract (Global Water Report, 2002) (see Table 1). New connections have occurred, but these have not targeted poor customers in proportion to their representation in the urban

¹¹ Jakarta Post 16 May 2000.

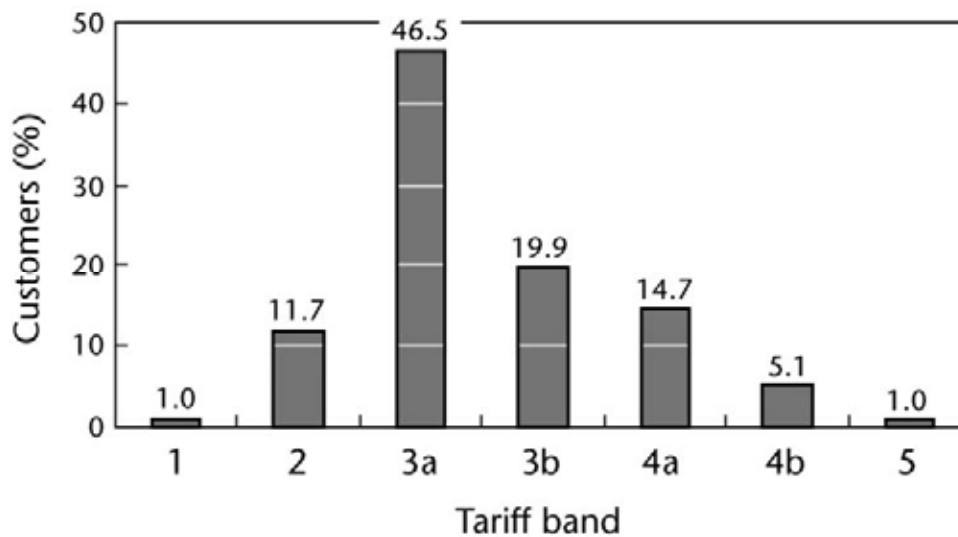
¹² Jakarta Post 19 Oct 2000.

population. Figure 2 illustrates the disproportionate weighting of consumer connections in middle-income tariff bands in 2003; whereas the majority of residents in Jakarta would fall into the 'lower middle' and 'low income' categories, 87 per cent of networked connections are provided to tariffs for middle-income households or above. This is, to some extent, the legacy of public sector management, attributable to unwillingness by the municipally-managed utility to extend the network into poor areas, due to fears about low cost recovery (Taylor 1983). It is also due to a tariff pricing policy in which water rates for public hydrants (used by poor households and water vendors) was higher per unit volume than water rates for individual households – implying a reduction in revenue when a poor household was connected to the network (Crane 1994).

Table 1: Service coverage for TPJ and Palyja

	Number of connections Unit		Service coverage ratio %	
	TPJ	Palyja	TPJ	Palyja
Baseline (before privatization)	231,607	176,980	52.00	38.00
Original Targets (1997)	361,607	395,522	70.00	70.00
Revised Targets (2002)	335,413	301,048	62.00	45.00
Realization (2002)	336,550	312,879	62.17	44.17

This legacy of the public sector under-provision of individual household connections to poor customers was not, however, redressed by the private concessionaires. Table 2 provides data on the numbers of new consumers connected in each tariff band by TPJ between 1998 and 2004. Only 25 per cent of new connections were targeted in the two lowest tariff bands (public hydrants, intended to serve those without household connections; and 'poor' and 'very poor' households). In other words, three quarters of new connections were for middle-income and upper-income households, government enterprises and commercial enterprises.

Figure 2: Customer connections and tariff bands**Table 2: Tariff groups and new connections**

	Tariff Group	# New connections	% increase
I	Social institutions and public hydrants	1,101	1
II	Public hospitals, poor and very poor households	21,898	24
IIIa	Middle-income households and small-scale businesses	51,847	58
IIIb	Upper middle income households and government offices	11,150	12
IVa	Large hotels, highrise buildings, banks and factories	2,323	3
IVb	Harbour/port	1,849	2
-			
	Total	90,167	100

Given that the private concessionaires are paid via a ‘water charge’, which is linked to volumes of water delivered into the water supply system but independent of revenues and tariffs, this bias towards wealthier consumers might seem surprising. There is no apparent direct disincentive to the private concessionaires to connect low-income households. Why, then, were customers in the lowest tariff bands less likely to be connected? An important part of the explanation lies in the pricing levels of the tariff bands (Table 3). The lowest tariff (May 2005 data) is Rp 550 per cubic metre (m³), well

below the production cost (of approximately 3,000 m³)¹³. Increasing the number of connections in the lowest tariff band thus decreases the average revenue per cubic metre supplied. Reducing the average revenue per cubic metre by connecting poor households would lower the municipality's revenues, in turn reducing their ability to pay the water charge, and to repay the debt shortfall owed to the private operators.

Table 3: Tariff band pricing

	Average Tariffs per Tariff Band Rp/M3 (2005)	Monthly fixed charges (Rp) (2005)	Tariff Group Description (2003 - 2005)	% customers per tariff band (2003 data)	% increase in tariffs (2003 - 2005)
I	550	4,695	Social institutions (e.g. religious facilities) and public hydrants	1.0	47
Ila	550	5,060	Public hospitals and very poor households	11.7	47
Ilb	2,450	10,440	Low income households	46.5	44
IIla	3,500	11,950	Middle income households and small-scale businesses	19.9	59
IIlb	5,100	19,390	Upper middle income households and government offices	14.7	32
IVa	9,750	19,390	Large hotels, highrise buildings, banks and factories	5.1	48
IVb	11,500	27,665	Harbour/port	1.0	31

A secondary disincentive is the higher average cost per connection in poor neighbourhoods, which raises installation costs: given the lack of land-use planning in informal settlements, the highly dense and disordered distribution of homes means that installing connections may be more time-consuming (if conventional underground infrastructure is used).

The municipality thus has two direct incentives not to target poorer neighbourhoods for new connections. This is an important explanation for why the utility, when under public management, did not connect poor customers. In turn, this produces an indirect disincentive for the private operators to connect poor customers: the revenue received by the municipality is the source of funds from which the private operators are paid, and decreasing revenues imply a greater chance of debt, a longer repayment period and an increased possibility of municipal default.

The disincentives built into Jakarta's water supply tariff structure are an example of how pricing strategies intended to increase access may have the opposite effect (Whittington, 1992). The remedy, as most commonly prescribed by international financial institutions, is to increase tariffs (a seemingly counterintuitive strategy), thereby removing the disincentive for connecting poor consumers and providing more capital to finance new connections (Azdan, 2001; Yepes, 1999). This recommendation is supported by studies, which assert that 'willingness-to-pay' and 'ability-to-pay' of poor customers is higher than previously thought. Frequently, the higher rates per unit volume paid by poor customers relying on water vendors are cited as evidence for this argument (Soto Montes de Oca et al., 2003; Winpenny, 1994). Indeed, the response to the problem of low tariffs in Jakarta has been a series of negotiated tariff increases, which have disproportionately raised tariffs for poorer and middle income groups (Table 3).

This, in turn, raises a more general point about water pricing, pertaining to the limits of cross-subsidisation within a water-pricing regime in cities like Jakarta with a large

¹³ Interview with Alizar Anwar, Advisor to the Jakarta Regulatory Body, May 2005.

proportion of poor residents. With a ratio of domestic to industrial customers of 4 to 1 and with relatively few users in higher tariff bands, possibilities for cross-subsidies in Jakarta are relatively limited. This suggests that in the absence of subsidies external to the water supply pricing regime – as are used in Chile, and were used in OECD (Organisation for Economic Co-operation and Development) countries like the UK (Bakker, 2004; Gomez-Lobo, 2001) – raising tariffs will not necessarily result in increased revenues and increased connection rates for the poor. As discussed in the following section, additional measures to reduce or remove disincentives for poor customers to choose network connections will also be required.

The failure to connect poor customers and the renegotiation of the contractual targets for connections have been the target of sustained critique by Jakarta-based NGOs, such as WALHI (Indonesian Forum for the Environment), Kruha, the Indonesian Consumer's Association and the Urban Poor Forum. These groups have launched campaigns using the media, direct action protests, testimonials from poor communities and a civil suit against the municipality of Jakarta and water companies, contesting the legality of tariff increases. The emergence of water as a conflictual issue in this regard is striking; interviews during a research visit in 2001 indicated that no NGOs in Jakarta thought water supply was a major issue, whereas it was the most high-profile and hotly contested issue for most of the same NGOs in 2005.

The controversial response by private companies and international financial institutions

Recognizing some of these barriers to connecting the poor, both private concessionaires have undertaken limited initiatives to improve access for poorer households. To render in-house connections more affordable, Palyja introduced a policy allowing poorer households (on the lowest tariff bands) to pay the connection fee in monthly instalments included in the monthly water bill.¹⁴ Partly as a result of this, in West Jakarta, the number of poor people served increased from 72,816 in February 1998 to 177,164 in December 2000 (ADB, 2003a), but monthly bills remain at a level above what many households can afford. In the eastern concession area, the community of Marunda was targeted by TPJ, which used a grant from its British parent company to subsidize the provision of in-house connections. Fewer than 500 households were connected; to facilitate payment, connection fees were waived and households were instead required to pay a deposit of approximately US \$2.50 (ADB, 2003a). Levels of water consumption have reportedly increased dramatically, while water bills have fallen substantially (ADB, 2003a). Prior to the concession contract, households in Marunda District generally received their water from private vendors who purchased water from tankers. Households used to spend, on average, US \$7.50 a month for 3 m³ of water (five 20-litre containers per day, at US \$0.05 a container); now they pay approximately US \$1.125 for 30 m³ of water (at US \$0.0375 per m³ – most customers being on a low tariff, reflecting the small size of their dwellings), consuming 10 times as much water but paying approximately one-seventh of their previous monthly bills, which is partly the reason for the high levels of cost recovery from the newly connected households (BPD, 2003). Recognizing the limited

¹⁴ The pro-rated monthly connection fee of US \$0.71 is included in the monthly water bill. A household consuming 20 m³ of water a month will thus have a monthly bill of about US \$1.50 (US \$0.0375 x 20 + \$0.71).

penetration of water supply network into poor neighbourhoods, the federal government launched a water supply programme in some of the poorest *kampungs* in 2004,¹⁵ but the provision of household connections was severely limited by the disincentives discussed above, compounded by an unwillingness of private partners to extend the network in conjunction with the government and by suspicion on the part of some public sector managers that publicly-provided infrastructure would end up providing implicit subsidies to the private sector (Shofiani, 2005).

Given, however, the high level of indebtedness of the municipal water utility to the private concessionaires, little interest has been shown on the part of the private companies in extending what are essentially charitable, loss-making initiatives. Accordingly, these 'pro-poor' initiatives have remained limited in scope and have not been duplicated elsewhere in the city. Without an explicit 'pro-poor' policy on the part of the Government and in the absence of specific pro-poor targets in the contract, new connections in poorer areas are likely to lag in proportion to the overall increase in new connections for the reasons discussed above. Recognizing this, donors have begun re-funding community water supply in Jakarta. The American bilateral aid donor USAID, through its Environmental Services Program (with a budget of US \$40 million over five years), is funding decentralized small-scale community water supply systems in West Java, including Jakarta. These community systems will not connect users to the network, but will rely on alternative technologies. The World Bank has approved a US \$5 million of 'output based aid' concessional loans for expanding network coverage in Jakarta.¹⁶ With an explicitly 'pro-poor' focus, this latter project provides cheap capital to the two concessionaires to connect the poor.

This, in turn, raises questions about the long-term ability of PSP contracts to supply water to the poor. Similar questions were raised in the World Panel on Financing Water Infrastructure report released at the Third World Water Forum in Kyoto in 2003. The panel articulated the need for a new financial architecture to stimulate and support flows of private capital for water and sanitation (Winpenny, 2003), including controversial calls to use official aid funding to support private sector involvement through the provision of low-cost finance and risk mitigation mechanisms, such as currency guarantees for private investors in developing countries.¹⁷ Implementing the pro-poor approach in this way would entail a potentially dramatic transformation in the premises and mechanisms of ODA finance, in which public funds are provided to subsidize poorer households, enabling private sector operators to manage water supply systems at a profit. Ironically, one of the key promises by advocates of PSP contracts has been the independent

¹⁵ Under the auspices of the Kimpraswil Fuel Subsidy Reduction Compensation programme, created to offset the impacts of a reduction in fuel subsidies on poor households.

¹⁶ At the time of writing (October 2005), the USAID project was underway and the World Bank project was in the tendering stage.

¹⁷ These proposals, as well as the composition of the Panel and the lack of public consultation on the report have been criticized by a number of organizations, which have raised numerous points: the focus on large-scale infrastructure and lack of emphasis on alternative technologies, levels of service, governance models, citizen input and methods of improving public sector performance; the focus on encouraging private sector involvement to the exclusion of other business models; and the ethics and feasibility of providing risk mitigation and cost reduction to the private sector via the use of public funds (Bakker, 2003b).

financing that private companies could provide under some types of PSP agreements. In contrast to these promises, some private water companies have more recently argued that they must have access to public funds, on concessionary terms (from governments, bilateral aid agencies or multilateral development banks) if they are to meet universal service coverage targets.

Conflict over alternative sources of water supply: A culture of corruption?

In order to understand conflict over water, it is necessary to put the situation in context; in Jakarta, as in many mega-cities in developing countries, most residents use multiple sources of water in the home (see Table 4). Due to poor quality, low pressure and incomplete coverage of the network, most residents depend on a variety of water sources, including deep and shallow wells, water vendors and bottled water (Berry, 1982; Gilbert and James, 1994; Lovei and Whittington, 1993; McGranahan et al., 2001). Residents of Jakarta obtain their water supply through a complex, heterogeneous set of sources, techniques and modes of delivery. Few residents rely on one source, using a combination of household piped network water connections, shallow and deep wells, public hydrants and water vendors for their water supply needs (Surjadi, 2002; 2003). According to our survey of 110 households in six Jakarta neighbourhoods in 2005, 61 per cent of households surveyed used multiple sources (the three most frequent combinations being network and vended water, network and groundwater, and groundwater and vended water).¹⁸

Table 4: Water sources in the home

Water source	Number of houses	Percentage
a) Groundwater	39	37
Groundwater with bottled water/vended water/public hydrant	41	39
Network water	10	09
Network water with groundwater	02	02
Public hydrant/vended water with rain water	14	13
Total	106	100
Total households using at least two sources	65	61
b) DW	03	03
Bottled water	12	11
Groundwater	70	64
Vended water	34	32
HU	07	06
PAM	32	29
Other: public toilet	04	04
Public hydrant	08	07
TA	13	12
Total	183	166

Total percentage exceeds 100, because some households use multiple water sources.

¹⁸ These findings are similar to the results of surveys conducted by Surjadi (1994; 2002; 2003) and McGranahan et al. (2001), the two most recent academic studies available.

The use of different water sources varies temporally and seasonally, due to quality and pressure concerns. Low pressure in the piped network means that households prefer to have a backup source – often a well. In some areas of the city, however, shallow groundwater cannot be used for drinking due to salinization and aquifer pollution resulting from pumping, sea-level intrusion and surface wastewater disposal in the absence of a sewerage system.

This heterogeneity of use is further complicated by Jakarta's spatial pattern of urban development and urban services provision. Within the city, an 'estate' pattern of blocks of commercial properties and colonial-era mansions on broad avenues is intermixed with dense 'illegal' settlements of poorly serviced houses and self-built dwellings in the inner blocks, empty lots and along any streets wide enough to accommodate built structures while still permitting the passage of traffic (Cowherd, 2002; Ford, 1993; Leaf, 1996; Porter, 1996). This is a pattern that has intensified since the informalization of much of the city's economy following the currency devaluation in 1998. Many neighbourhoods do not have access to piped water, as the water network is concentrated in wealthier areas of the city (Martijn, 2005). The resulting spatial differentiation of land-use and income has created an 'urban dualism', with middle-class houses abutting informal housing in a highly variable urban micro-geography in which multiple water sources will be in use simultaneously.

Even in those areas with networked water supply, many homes do not have individual household connections. In an extensive survey, Susantono (2001) has found that informal water services 'thrive' in neighbourhoods where formal services are available, with households relying on water vendors even when they have the option of house connections with the municipal water utility. Physical proximity of the network (as indicated by the distribution of a tertiary pipe network in the neighbourhood) is not, in other words, linearly correlated with residential network connections.

Why would this be the case? The answer is that the choice of which source to use is influenced by factors other than physical availability of a network. One important factor is the total cost of water supply (as distinct from the cost per unit volume of water). In a pattern typical of cities in the developing world (Cairncross et al., 1990; Gulyani, 2005; Swyngedouw, 1997), piped water supply costs less per unit volume in Jakarta than other modes of water supply, particularly vended water. In comparisons of the prices of vendor water versus networked water supply, the price per unit volume was found to be from 10 to 32 times more expensive for vendor water (ADB, 2003; McGranahan et al., 2003b).¹⁹ Poor households typically rely on vendor water, whereas wealthier households have access to the networked water supply system; as a result, many poor households pay more per unit volume of water than do wealthier residents of the city. Given their lower incomes, many poor households pay a much higher proportion of their income for water than wealthier households. In our survey of 110 households, 43 per cent of households spent more than 5 per cent of their income on water bills (often cited as the appropriate

¹⁹ Another source for this finding is a survey conducted by the author in the neighbourhood of Sunter Agung in January 2001. ADB gives a maximum figure of US \$4.17/m³.

threshold by international aid organizations).²⁰ In other words, wealthier households with a networked connection receive water at a lower cost per unit volume, spending lower proportions of income for much greater quantities of water. Unsurprisingly, there is a positive correlation between levels of water consumption and wealth in Jakarta (McGranahan et al., 2001).

On the basis of cost per unit volume alone, then, it seems counter-intuitive that poor households would not connect to the water supply network where possible. However, the disincentive for connection becomes more obvious when we consider the *total cost* of connecting to the water supply system (as opposed to price per unit volume of water supply). Monthly bills include more than charges per unit volumes of water consumed. Fixed charges, such as the meter fee and the annual charge, are also added on to the bill (Table 3). For a poor household whose residents consume 50 litres per person per day (the World Health Organization recommended minimum), the fixed charges will be anywhere from 5 to 10 times as high as the volumetric consumption charge; the effective cost per unit volume will thus be higher than that of vended water for the poorest consumers. Moreover, a networked water supply implies additional infrastructure costs to be borne by the consumer, in the form of a water tank or holding device, made necessary because of the intermittent nature of water supply through the piped network (with cutoffs of several hours occurring daily in some areas). Transaction costs are also significant; long waiting times at water utility offices to pay bills and clear up meter mis-readings increase transaction costs compared to the ease of complaint handling and convenience of home visits by vendors to collect bill payments. Connection fees are also significant (ranging from Rp 200,000 to Rp 350,000 in the households surveyed), relative to average incomes of poor households (which averaged Rp 1.4 million in the households surveyed), and must usually be provided as a lump sum, which may pose significant barriers to households with small, irregular incomes. Connection fees also vary depending on distance from the network. Poor households are more likely to live in areas of lower network density (Figure 1) and thus pay higher fees for connecting. For all of these reasons, overall costs to poor households of vended water may be lower than networked water supply, even though the latter has a lower price per unit volume. Given these cost barriers, payment flexibility permitted by vendors (some of whom even allow customers to buy water on credit) is an important incentive for poor households, often with a limited budgeting ability, to choose vended water over networked water (Susantono, 2001; Shofiani, 2003).

Another important factor is land tenure. Deep wells are expensive and have higher maintenance costs, which effectively prohibits development by those without permanent tenure. A significant proportion of the city's population lives in temporary (often self-built) accommodation without secure tenure. In these instances, public hydrants and vended water become the sole or primary source of supply. Surjadi et al. (1994) found that over 20 per cent of the city's residents regularly buy drinking water from vendors. The most recent academic survey have found that approximately one-third of Jakarta's

²⁰ A study of 1,000 households in Jakarta examining the different prices paid by different wealth groups found that, overall, the poor pay on average twice as much per cubic metre as the wealthy (McGranahan et al., 2001), and that water expenditure represents, on average, 10 per cent of income in poor households.

households purchase water from street vendors (Crane and Daniere, 1996); these figures correspond with the results of our household survey, which found that 31 per cent of respondents regularly bought vended water (Table 4).

Another disincentive to connect to the network is its perceived low water quality. In our survey, networked water was perceived to be of lower quality than other sources of water (especially groundwater), particularly by more educated respondents. Residents of Jakarta perceive groundwater to be of higher quality than either vended or network water. Indeed, the most comprehensive comparative survey of water quality of different sources in poor neighbourhoods in Jakarta to date found that samples of drinking water from the network were more contaminated with fecal coliform than groundwater (Surjadi et al., 1994). In some cases, vended water was perceived to be of higher quality than networked water supply. The fact that vendors check water quality and may strain the water or let it settle before delivering explains why perceptions of vended water quality may be higher, despite the fact that vendor water often originates in hydrants connected to the networked water supply system.

Weak governance, violence and environmental deterioration

International financial institutions often claim that one of the most important factors contributing to low levels of water services provision in Jakarta is the low level of infrastructure finance (Akhtar, 2005; World Bank, 2004), exacerbated by the Asian financial crisis and currency devaluation. Initiatives such as the Indonesia Infrastructure Summit (held in Jakarta in early 2005) have explicitly targeted foreign direct investment. The government has identified a significant shortfall in financing requirements for rehabilitation and extension of urban infrastructure. Jakarta's infrastructure 'crisis' is not, however, a new phenomenon. Indeed, the current lack of funding for services is compounded by the legacy of deliberate under-investment during the 1960s and 1970s, a period of extremely rapid population growth as policy-makers sought to discourage rural-urban migration²¹ and articulated a policy stance that sewerage was a 'private concern' (Argo, 1999; Cowherd, 2002). Population growth and a lack of finance are only partial explanations for this situation. Where International Financial Institutions do mention governance, they tend to focus on jurisdictional fragmentation and municipal budgetary governance. Certainly, jurisdictional fragmentation has reduced the ability of any one level of government in Jakarta to effectively govern water resources within a watershed, or even within urban boundaries.²² Municipal governance structures are another factor.

²¹ The city of Jakarta alone grew from 1.8 million people in 1950 to 6.5 million in 1980, with equally rapid population growth in the surrounding metropolitan areas (with the total population of the greater metropolitan area now estimated at 18 million), implying rapid increases in population density and significant changes in land-use (Chifos, 2000; Firman 1997; 1998; 2000; Lo and Yeung, 1996).

²² In the Jakarta region, for example, the majority of the JMA is a politically constituted as an independent territory with a status of a province – 'DKI Jakarta' (Special Capital Region of Jakarta). The city governor is independent from West Java province, and (together with the municipal government) controls the city's water supply company: PAM Jaya. The province of West Java is responsible for the urban areas that fall outside of DKI Jakarta, and for the watershed in which the main Jatiluhur reservoir for Jakarta's water supply is sited, well upstream from the city. Environmental and urban planning regulations are not systematically applied within the watershed, and the open canals, which act as conduits for Jatiluhur water, are polluted by residential and industrial effluent, posing serious water quality challenges to the municipal water supply utility engineers. Meanwhile, within the city, tackling groundwater pollution from effluent

In Jakarta (as with other cities in Indonesia and indeed around the world), water utility budgets were not separated from the rest of the municipality budget. Rather, a small tax base and the presence of few alternative revenue-generating activities for the municipal government encouraged the use of water utility revenues for non-water related expenditure by municipal politicians and managers. For many water supply utilities in Indonesia, this had the effect of reducing the amount of revenues available to cover operating costs and fund capital expenditure (notably infrastructure rehabilitation and improvement) exacerbated by relatively low cost recovery rates. Like water supply utilities in developing countries, Indonesian water providers are often caught in a vicious cycle: low cost recovery, low revenue, low investment and low levels of service (Bakker, 2003a; Cross and Morel, 2005; Nunan and Satterthwaite, 2001).

This view of the reasons for failure to supply water in cities like Jakarta overlooks some of the major causes of conflict over water and also overlooks other factors relevant to the 'weakness' of Jakarta's water supply system. As discussed in the previous section, urban poor households have strong disincentives to connect to the network, and the water companies and municipal government have economic disincentives to connecting them. These disincentives are often overlooked by international financial institutions. In addition, two other factors reinforce these disincentives.

First, a culture of violence underpins alternative water supply systems in the city, particularly standpipes and water vending, which are controlled by an interlocking set of mafia-like groups in the city. Water vendors typically operate as spatial monopolists; in Jakarta, vendors do not compete, but rather collude to establish monopoly supply zones and a captive clientele (Susantono, 2001). Water vending is controlled by a complex network of middlemen running tankers, ambulatory water vendors and public standpipes connected to PAM Jaya's network (Lovei and Whittington, 1993). The monopoly rent extracted from the city's poor represents an attractive source of profits. Indeed, the potential profitability of extracting rent from the captive market of water consumers is recognized through the practice of selling informal 'licenses' amongst water vendors (Susantono, 2001). In Jakarta, as in other cities, this monopolistic behaviour is sometimes linked with organized crime and is at times characterized by the intimidation of (if not outright violence towards) customers, competing vendors and police and water company employees who attempt to eradicate informal water vending practices. To put it crudely, mafia-like control of water vending in poor areas of the city is a significant barrier to network expansion. This is significant, as surveys have found that approximately one-third of Jakarta's households purchase water from street vendors (World Bank, 1993; Crane and Danieri, 1996; 1997; and survey by author in June/July 2005) (Table 4). An even more startling form of illegal activity are the illegal network builders (some of whom even operate with business cards), who install illegal tertiary pipes and household connections without the authorization (and often the knowledge) of the water supply concessionaires; Palyja/Suez estimated 30 *kilometres* of illegal pipeline in their concession area alone in 2005.

within the city is complicated by the division of responsibility amongst the sewerage authority, the municipal water utility (which controls networked water supply), and the national government's Ministry of Mines, which bears responsibility for regulating deep (i.e. drilled) wells, from which a substantial proportion of the city's residents draw water.

Second, a culture of urban governance in Indonesia shapes urban planning policy in ways that discourage government initiatives for systematic, structured water supply initiatives. As Anderson (1990) and Kusno (1997) have argued, the idea of ‘power’ in Javanese culture can be understood via the spatial metaphor of the ‘beacon’, in which the concentration and affirmation of power at the centre (the palace or the capital city) enables an extension of power over the periphery. Power, in other words, is defined by the centre, projecting a strong and unified source of authority. State governance and the patron-client hierarchies that embody it are directed towards affirming the centrality of state power. In the context of urban planning, this means that state activities are often geared towards the reaffirmation of prestige and the reinforcement of networks of patronage, rather than public welfare per se (Cowherd, 2002; Kusno, 1998; 2000). In the post-Independence era, high priority was given to an urban redevelopment agenda focused on highly visible infrastructure (avenues, highways, parks, monuments and sculptures). This ‘monumentalist’ infrastructure served a dual purpose of urban development and source of pride for the new nation, whereas urban services provision and the urban environment were given relatively low priority (Chifos and Hendropranoto, 2000; Firman and Dharmapatni, 1994; Ford, 1993; Kusno, 1997; World Bank, 2004b), despite sporadic national government-led development plans to accelerate service delivery (Silas, 2002). The ‘monumentalist’ architecture of Jakarta’s central corridor under Presidents Sukarno and Suharto (whose reigns lasted successively from Independence until 1998), together with the relative neglect of infrastructure and public services of all kinds for the urban periphery, are illustrative of the implications of this model of urban governance. Where ‘pro-poor’ water supply initiatives do occur, they are often sporadic, intermittent and emphasize state largesse (and recipient gratitude) rather than an integrated and long-term approach to network extension.

Conclusions: Externalizing the costs of conflict to poor households and the environment

As discussed above, multiple factors underlie water supply conflicts in Jakarta: a prestige-oriented culture of urban governance; violence and illegality in the informal water supply sector; and multiple disincentives to connect the poor on the part of the government, private concessionaires and poor households themselves. The costs are largely externalized to poor consumers and the environment.

With respect to poor consumers, domestic per capita water consumption is estimated to be between 70 and 80 litres, one of the lowest of the 18 large Asian cities surveyed by the Asian Development Bank (ADB, 2003b). The city has almost no sewer system, with fewer than 2 per cent of households connected to a sewerage system (ADB, 2003b); the vast majority of wastewater is disposed directly to rivers, canals, or (often poorly functioning) septic tanks (Crane, 1994; McIntosh, 2003; Surjadi, 2002). Rivers and canals are sometimes too polluted to use for even washing clothing. Contamination by wastewater and industrial effluent, as well as seawater infiltration due to over-pumping have in turn polluted the shallow aquifer in many areas of the city. Reliance on groundwater as one of multiple sources of water is common in Jakarta and provides a de facto alternative to networked water. But while wealthy residents rely on cleaner, but more expensive, deep wells, poor residents rely on shallow aquifers (see Table 4). In some areas, depletion and salinization of the latter has rendered water unfit for drinking

and cooking (Braadbaart and Braadbaart, 1997). The public health impacts of this situation are predictable and have been well documented: high rates of water-related diseases, including gastrointestinal illness due to contaminated water and parasite-related illnesses due to poor drainage, particularly in poorer areas (Agtini et al., 2005; Leitmann, 1995; McGranahan et al., 2001; Simanjuntak et al., 2001; Surjadi, 2003). This has deepened the reliance of poor households on water vendors in North Jakarta (the poorest part of the city and the area with the greatest salt intrusion into the aquifers), further entrenching the parallel and informal networks of vended water suppliers. The failure to extend water supply has, ironically and tragically, increased environmental degradation and the ‘informalization’ of the water supply sector in Jakarta.

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Urban water conflicts in Italy: An ecological-economic analysis¹

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Introduction

Urban water services (UWS) have undergone a radical transformation in the last 20 years in most developed countries (de La Motte et al., 2005; Finger and Allouche, 2006; Massarutto, 2006). Some of the most important axes include changes from local management to regional integration; from public subsidies and public finance to full cost recovery and market finance; from direct management of local authorities to various forms of independent and professional water industry, often (although not necessarily) with the involvement of the private sector;² from the dominance of water supply and urban network to that of water resources management at the river basin scale and the growing emphasis on cleanup, treatment and conservation of resources; from simple, discretionary and benevolent regulation to more sophisticated, controversial and adversarial regulatory systems; from sectoral water policy focused on infrastructure development to integrated management focused on sustainability.

This modernization has been driven by powerful forces. To use a famous image by Boulding, human societies are learning a new way of managing water, from the 'extensive' model of the 'cowboy' economy, where natural resources do not represent a limit to growth provided that enough investment is put in place, to a 'spaceship' model,

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² Private sector involvement (PSI) is intended here in its widest meaning; it involves regulated private monopoly with full divestiture (e.g. England and Wales), full or partial delegation via competitive tendering (e.g. France), outsourcing of activities from public entities, and various forms of private-public partnerships for operation.

in which finiteness of resources requires careful management aimed at reproducing them locally in the long term.

On the other hand, modernization also implies complex and unwelcome outcomes that go largely beyond the sphere of water management. The rising costs of water management pose questions of affordability and challenge basic social rights. Integrated management forces local communities to give up control over their local territory in order to share resources (and problems) with other communities on a larger territorial scale. Water uses that have been established during centuries may have to be given up in order to allow space for new emerging societal demands. Increased corporatization (if not privatization) of water service operation implies a loss of control and a strong delegation of power to professionals and 'water experts', whose faithfulness to the general interest of the community has to be proven.

To put it differently, the sustainability of UWS is not only and simply a technical, managerial and economic problem; it requires instead a thorough adaptation of the institutional, political and social spheres. The outcome of transformation cannot be reduced to different technological solutions; it should be able to reproduce the basis of cohesion, trust, legitimacy and consensus; which on its own implies that patterns of allocations of costs and benefits (or, more generally, negative and positive outcomes) be perceived as fair. And much more than that, since this perception also has its roots in common 'cultures' and 'rules of reason' that need to be developed and shared through an open participation (Swyngedouw et al., 2002). In this perspective, the transformation of UWS can be described as a problem of governance (Hanf and Jansen, 1998; Picciotto, 1997), whose solution cannot be asked of the interplay of individuals within the given set of cultures and institutional rules, but rather implies a reconstruction of both (Amin, 1997).

This transformation has a particular meaning in European Mediterranean countries, where the tradition of municipalism and local management has been historically stronger than elsewhere, and where public subsidies still represent a substantial part of UWS financing, and government policies have traditionally been biased towards infrastructure, not only for UWS but also for irrigation and industry. The Italian case represents a good illustration of the kind of problems that the transition is causing in similar contexts.

The aim of the present paper is to single out the most important critical aspects of the ongoing Italian reform of UWS. It adopts a framework derived from ecological economic theory, based on the idea that UWS are a substantial component of water sustainability; ecological, economic and social sustainability issues concern physical water assets, as well as natural resources: effectiveness (in terms of environmental policy and provision of access to water); economic efficiency of investment, long-term viability of water industry and equitable sharing of water utilities costs.

We begin with a brief overview of the ecological economic approach to water sustainability that enlightens the crucial importance of UWS; this is followed by an analysis of the present trend of UWS management and the crisis of the supply-side approach. Pressures arising from this change towards private sector involvement and full-cost recovery are then discussed in general terms. The main features of the Italian UWS reform are discussed, followed by a broad and general analysis of conflict

dimensions that are suggested by the analysis. The final section presents the results of an original study carried out in two Italian Regions (Lombardia and Emilia-Romagna) aimed at an assessment of the likelihood of such conflicts and trade-offs to occur in the medium to long term.

An ecological-economic framework for urban water conflicts

The reason why UWS modernization might cause conflicts is not obvious. After all, in everyday life, people must often choose between alternatives that are mutually exclusive, and this does not necessarily imply conflict, provided that the rules followed in the decision are agreed and perceived as legitimate, fair and reasonable. Allocation of a scarce resource implies that some social demands will have to remain unsatisfied: this is intrinsic in the very meaning of the word 'scarcity'. Allocative choices imply trade-offs, whose solution might or might not cause conflict, depending on the capability of the existing set of rules, property rights and management systems to solve the related issues in a way that is both socially acceptable and sustainable in the long term. Conflict arises, in turn, when the institutional setting is not compatible with the 'technical' solutions that might be foreseen.

In pure mainstream neo-classical economics, conflicts do not exist, since the market is the universal engine providing solutions to trade-offs in a way that ensures the maximum of benefits. If a would-be user of a scarce resource has to remain unsatisfied, this is due to the fact that his demand is not worthy enough. Welfare economic theory has provided a coherent framework to deal with trade-offs when they entail an economic dimension: i.e. when the values at stake are commensurable with each other. Cost-benefit analysis states that a given alternative is better than another (from a social welfare point of view) if its total cost is lower than its total benefits; where 'costs' mean the 'opportunity costs', that is the economic value of alternatives that are sacrificed. Since society is an aggregate of individuals and groups that are affected by costs and benefits in a different way, this test can be refined by introducing compensation for the 'net losers': if total benefits are larger than costs, distribution of outcomes can be re-arranged in order for all concerned groups to gain.

However, in the real world, this does not necessarily take place: first, because the redistribution of outcomes does not actually occur, or cannot occur in a given institutional framework (Johnston, 1996; Saleth and Dinar, 2004); second, because trade-offs are not always and not only economic – in other words, values cannot always be expressed in the same unit of measurement (e.g. monetary values), allowing them to be evaluated in a coherent way (Martinez-Alier et al., 1998); third, because the net losers could be future generations (Ekins, 2000). The theoretical framework of ecological economics has developed the concept of *strong sustainability*, according to which values that cannot be traded off require the definition of specific constraints and threshold values to be achieved in order to achieve sustainability; this occurs in particular whenever 'critical natural capital' is at stake, namely, environmental resources that cannot be substituted for the provision of valuable functions that society cannot accept to give up.

The water sector is an excellent example for applying these concepts, due to its multifunctionality. Water sustainability involves ecological dimensions (because it is a scarce and fragile natural resource and a basic necessity for ecological life), as well as

economic (water as a scarce valuable input having an economic value) and social dimensions (water as a basic need to be guaranteed as social right and shared in an equitable way). Water provides a large set of valuable environmental functions (EFs), entailing economic as well as non-economic values (Fontana and Massarutto, 1995). Many of these functions are critical ('water needs' to be satisfied at any cost; 'social rights' to be guaranteed, etc.), while others can be even in principle traded off ('water demands', whose value can in principle be compensated by other economic values).

In a narrow sense, an economic approach to water policy issues can deal with the concept of 'water intended as an economic good', i.e. considering only those values that belong to the economic sphere (Dalhuisen et al., 2001). In a broader meaning, the economics of water should be able to understand the multiple dimensions of scarcity that arise both from economic and non-economic spheres (Green, 2003). Following this latter perspective, an economic approach – 'applying reason to choices', by Green's own definition – is not incompatible with the recognition that some demands are not to be evaluated in terms of economic efficiency, but rather in terms of social justice, ecological soundness, political acceptability, etc.

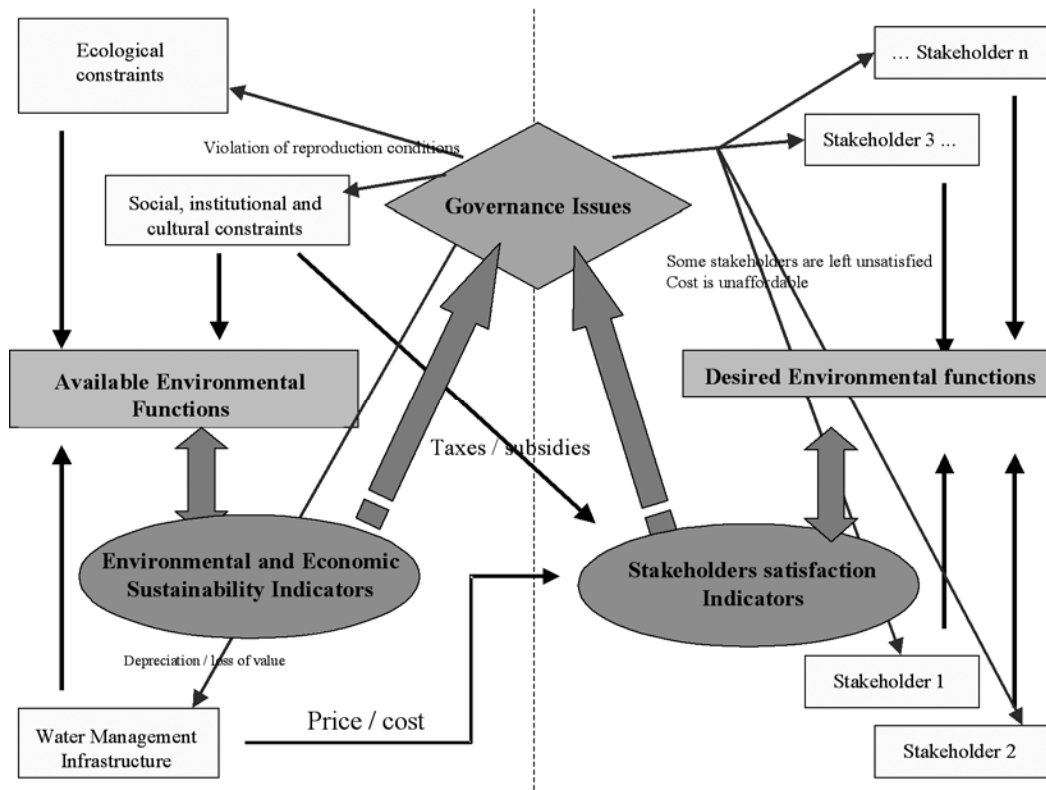
On the other hand, the water domain is also characterized by some degrees of substitution between man-made and natural capital: at some (finite) cost, the production and transfer of freshwater can be made in virtually any desired quantity.³ This is true at least for some EFs, especially those in which economic values are predominant.⁴ The social choice problem here is whether this cost is worthwhile (i.e. if the value of water demands is higher) and if it is acceptable for users to pay for it. This consideration is fundamental, since it enlarges the spectrum of trade-offs (and potential conflicts): these do not concern only appropriation and use of water as a natural resource, but also the inter- and intra-generational allocation of the costs of artificial water systems; in the same way, sustainability does not only regard inter-generational aspects of natural resources management, but also includes economic and financial viability of the UWS industry (de Carli et al., 2003). In other words, both natural and man-made capital belong to the category of 'critical capital' and therefore require strong sustainability criteria (Massarutto, 2005).

Governance issues arise when there is a mismatch between social demands and availability (see Figure 1). Given the multidimensional nature of water values, governance issues can arise from many different mismatches between available and demanded EFs. We have identified the categories reported in Table 1. From the above discussion, water availability is constrained by physical scarcity, depending on hydrologic factors (opportunity cost of water) as well as by costliness of water services (opportunity cost of labour and capital) and by the set of institutional rules, property rights and shared cultures that, in any given historical context, frame the spectrum of available alternatives.

³ At a given cost (high, though finite) it is possible to produce any quantity of water. Desalination, which can be considered as the backstop technology, has reached costs in the order of 0.5-1 €/m³ (Lora et al., 2003).

⁴ Although these uses do not exhaust the spectrum of water-related EFs, it should be noted that they represent by far the greatest source of water abstraction and impact on water bodies.

Figure 1: Governance issues



For example, a community can be simply too poor to afford UWS, or the cost of UWS can be higher than the value of additional environmental functions; or, finally, people may be unwilling to pay higher taxes or higher water prices for ideological reasons. The effectiveness of the management system provides a further dimension to understand. The institutional setting represents the ultimate constraint, determining in the short to medium term what governance issues are capable of being solved (Saleth and Dinar, 2004). In this sense, scarcity might result also from institutional reasons, because existing institutions are not able to achieve an acceptable solution to certain governance issues (Massarutto and Verga, 2005). For example, the existing set of water rights might be incapable of solving a given problem (e.g. the over-exploitation of an aquifer), but the setting up of a new institutional framework is not possible because a political agreement cannot be found.

Table 1: Governance issues in the water management sphere

TYPOLOGY	Description	Dimension	Critical aspects
Access	<ul style="list-style-type: none"> who has the right to use the resources? what criteria are used for allocating water rights? are those that cannot have access to water being compensated in some way? And by whom? 	Sectoral Territorial Economic	Property rights allocation / tradability Historical rights Planning criteria
Segregation of uses	<ul style="list-style-type: none"> some users' actions make water unusable or inaccessible to other users some users generate externalities that are suffered by other (potential) water users or by society as a whole 	Sectoral Territorial Economic	Externalities Regulatory institutions Planning criteria
Status and identity	<ul style="list-style-type: none"> local communities fear to become "the garbage can" of other communities or to be forced to share resources and problems with other communities; local communities lose control over what they perceive as "their" territory and resources 	Territorial Social Political	Balance of power (central / local) Planning dimension Finance of new infrastructure
Democracy	<ul style="list-style-type: none"> the increased technical complexity of decision forces the community to delegate decision to professionals and 'experts' and to subtract power to the individuals and the community; users with large political or market power can weigh more in the political decision 	Social Cultural Institutional	Participation Transparency Representation of interests Tradition Social conflict Regulatory institutions
Ecology	<ul style="list-style-type: none"> conservation of NC for the next generation is not guaranteed because conflicting demands tend to overuse it and next generations are not represented Resilience of water management systems and capacity to adapt to future challenges Basic ecological functions of water systems threatened by economic and urban development 	Inter-generational	Research Investment Collective understanding of water as a constraining factor
Artificialization	<ul style="list-style-type: none"> Is development of water infrastructure worthwhile? Allocation of costs should be fair and not jeopardize affordability Water management systems should remain economically and financially viable; Deterioration of assets should be compensated by depreciation 	Inter-generational Fiscal Economic	Efficiency of financial markets Public/private relationship and patterns of PSI Is economic growth rapid enough for guaranteeing affordability of WSS the future?
Allocation of costs and economic risks	<ul style="list-style-type: none"> Is the allocation of costs (between individual users / sectors of use / territorial regions) fair? Are some users excluded because they cannot afford the water bill? Is the allocation of costs between users and taxpayers compatible with the constraints on public budget and with the need to avoid perverse incentives? Is the allocation of economic risks coherent with the remuneration received? 	Fiscal Economic Regulation Equity	Instruments for cost equalization Economic balance between "users" and "taxpayers" Risk-sharing mechanisms

The inability to develop an appropriate set of property rights can be driven back to the situation known in the public choice literature as the ‘tyranny of the status quo’, which typically arises when a decision requires unanimity of consensus (Mueller, 1990). North (1990) and Bromley (1991), in turn, emphasize that the process of institutional building does not occur mechanically, but rather through trial and error, in which communities that are more able than others to develop appropriate institutional settings will be able to solve environmental problems. The process of institutional change is constrained by the rent-seeking of economic actors and transactions costs of change (Johnston, 1996). Massarutto and Verga (2005) argue that a ‘tyranny of the status quo’ might arise in all of those cases in which the policy-maker has the formal power to decide (even with a majority rule), but is unable to exert power over the implementation chain because of information asymmetries or lack of control over essential resources. As Saleth and Dinar put it, ‘water scarcity, whether quantitative, qualitative or both, originates more from inefficient use and poor management than from any real physical limits on supply augmentation’ (Saleth and Dinar, 2004).

We can affirm that a carrying capacity has been reached when one of the above scarcity limits has been violated. This poses a ‘limit to growth’ to environmental functions that can be satisfied by the existing set of water and economic resources. Reaching this limit means that a trade-off between social demands has to be managed and solved, and if it cannot be solved in the existing framework, this poses a sustainability issue.

The limit is not set once forever: an income improvement may enable the community to pay for UWS that would previously have been unaffordable; technological improvements might render UWS provision possible (or simply cheaper); new governance institutions might cope with political incapability to decide. But in the short term, the individuation of a carrying capacity limit leads to considering water resources – at that particular territorial scale – as a CNC, and thus to pose an upper limit to their consumptive use.

This discussion also underlines the importance of UWS for sustainability. Water sustainability does not only regard natural water resources, but also the long-run viability of the management systems, the capacity to renovate artificial assets and finance its long-term maintenance and operation. For this reason, the assessment of cost-recovery is crucial for sustainability. It is not necessarily intended in neoclassical economic terms as the need to ensure optimal allocation of resources through marginal-cost pricing, but rather to assess the long-term capacity of the community to raise the financial means that ensure its viable operation, whether through prices or taxes, or which equalization measures are actually put in place (Green, 2003; Massarutto, 2005).

Economic development, sustainability and new water management paradigms

This simple conceptual model helps us to understand the evolution of water policies in the past and the present. Economic development in the long term affects the relationship between water and society in two different ways. On one hand, it increases the capacity to finance WSS expansion and positively affects innovation; on the other hand, it causes demand growth (especially for those EF that are income-elastic) and causes increasing

external effects. The final effect on sustainability is thus ambiguous. Sustainability of actual patterns of water use requires that the GDP grow more rapidly than the cost of WSS induced by demand expansion and/or depletion of natural capital.

In the literature, the optimist attitude is shared by those believing in an ‘Environmental Kuznets curve’ (namely, a positive relationship between economic growth and sustainability). In the case of water, for example, many indicators seem to show that last century’s growth patterns have been sustainable, since the GDP has grown more rapidly than the deterioration of water capital, thus allowing for investments in WSS that have ultimately improved both supply and water quality. As a result, in most developed countries, water quality as well as river ecosystems are much better now than they were 100 years ago. On the other hand, the very belief that this trend will not be reversed in the future is not based on any empirical evidence. Water being a CNC, a precautionary principle might therefore be invoked.

The dominant model of the last two centuries – what Arrojo et al. (2005) have referred to as the ‘structuralist’ model – can be described as follows:

- Substantial growth of demand for EF is correlated with economic growth; as a result, per-capita water demand and per-capita pollution loads have increased over the last two centuries, much above the ‘natural’ carrying capacity of water environments.
- This demand growth is compensated by a dramatic increase in artificial WSS; this can be shown for example by the continuous increase of the per capita cumulated investment in water assets, which is made possible both by the significant improvements of civil works engineering and economic growth.
- In a first phase, social investment in WSS expansion improves the supply of EF, complimenting those furnished by the NC; in a following phase, NC itself deteriorates (because of increased pollution loads and over-abstractions), and WSS expansion is also required for compensating this loss.
- Much of the supply increase is made possible through the development of public services with substantial investment costs carried on by the public budget.

The crisis of the structuralist model arises from many different sources of unsustainability:

- Emergence of new social demands for water quality, while ‘traditional’ demand, focuses on quantity, has reduced its growth, demand for environmental quality cannot be easily satisfied through a simple expansion of WSS.
- Deterioration of NC reaches critical levels and hampered further critical EF.
- Evidence that at least some uses are greatly subsidized, and this subsidization is unjustifiable, since they hardly belong (anymore) to the ‘merit’ uses category.
- Evidence that further expansion in WSS (at least for water supplies) is often unjustified in economic terms.
- Crisis of public finance and requirement for involving users in the financing of WSS, in the context of rapidly increasing costs of service provision.

The Water Framework Directive (WFD) can be seen as a turning point, beginning a new European water policy focused on sustainability (Barraqué, 2004; Kallis and Nijkamp, 2000). Among its basic principles are the conservation of natural capital at a good ecological status; the prevention of further deterioration; economic assessment aimed at implementing an efficient allocation; full-cost recovery aimed at avoiding that artificial water assets are developed beyond the social willingness and ability to pay; public participation in order to ensure that all social stake are duly taken into account.

Transferred into the analytical framework outlined above, the crisis of the structuralist model can be interpreted on the base of the increasing costs that society has to face (and consequently share). This is particularly true for external costs.

As far as UWS are concerned, Barraqué (2005) has argued that the supply-side approach at some point starts to be a vicious cycle: increasing social demands call for further artificialization and further delegation of power and responsibility to the ‘experts’ and the technical structure. This causes further costs (both in terms of financial costs and externalities that are generated on other water users) and calls for further pressures to develop the artificial system. This vicious cycle generates conflict through the tension between social demand for water services and the need to allocate the underlying increasing costs.

Further forces drive conflictual outcomes. This process also entails growth in territorial scale (and thus increasing *physical* distance between citizens and decision-makers), increasing professional specialization (and thus increasing *cultural* distance) and finally increasing pressure to become economically efficient, which usually ends up in the acquisition of a business-like mentality of water operators if not full privatization (and thus increasing *motivational* distance between profit-oriented water companies and local political stakes).

All of these factors erode the basis of consensus and legitimacy of the dominant model of managing UWS and generate the pressure towards new solutions.

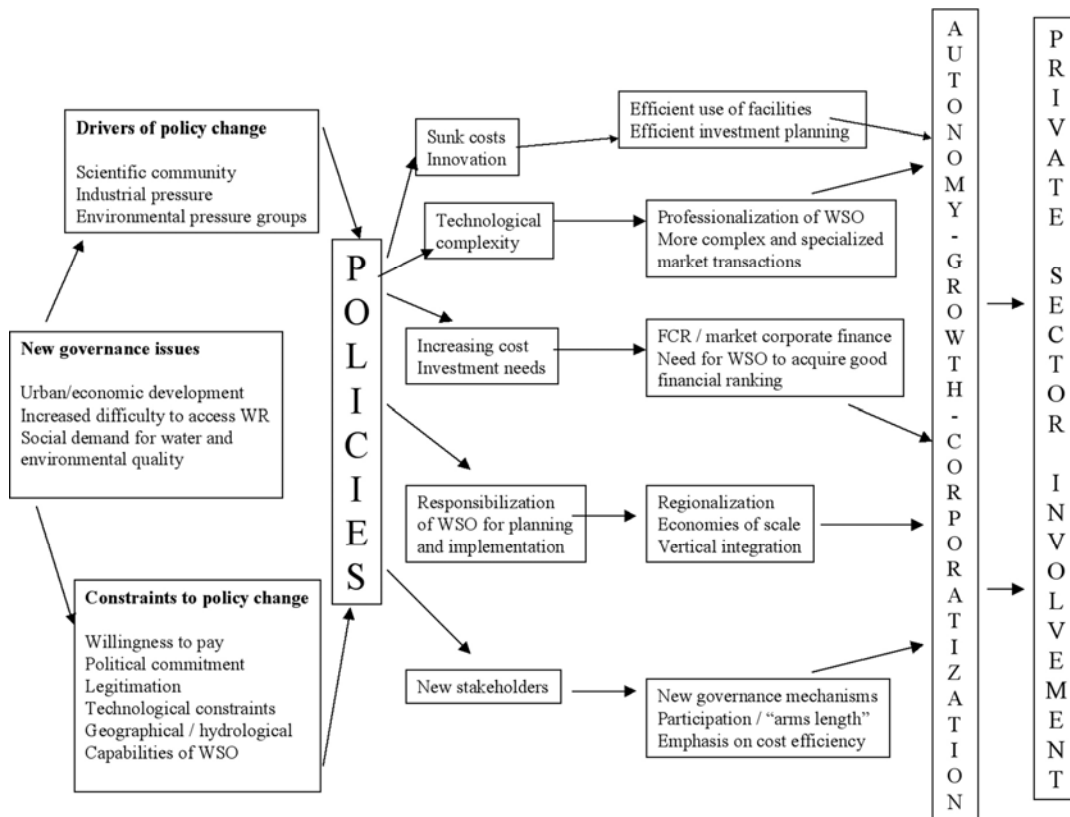
Pressures towards modernization of UWS

Figure 2 summarizes the main forces that drive UWS modernization (Massarutto, 2006). Pressures for change arise from the water policy sphere and are started by the appearance of new governance issues (e.g. new stakeholders bringing in new dimensions of demand; degradation of water quality causing the impossibility of traditional water management and regulation to carry on providing the same environmental functions as before); however, governance issues are not relevant as such, but rather are filtrated by the water policy network.

On one hand, we can thus individuate those actors in the policy community having the capacity to make pressure on policymakers: ‘water experts’ recognize problems and propose solutions; the scientific community provides means for appreciating issues; water industry develops technologies and declares its capability to solve problems; water users make pressure in order to have more water available; environmental pressure groups ask for improved water quality, etc. Of course, there might be a close interaction

between these actors: for example, scientific research can be influenced by the water industry financing it; the appreciation of some problems and issues might be strongly conditioned by investment already made by the water industry and by its perception of what can or should be done.

Figure 2: UWS Modernization



On the other hand, we can find factors that constrain water policy action: availability of financial resources, readiness to pay by consumers, as well as geographical and institutional factors (e.g. localism, efficiency of the public administration, relative weight of water-related issues in the political arena).

Altogether, these factors shape and determine new water policies putting pressure on UWS, e.g. increasing quality standards and/or promoting new water investment. As we have argued before, a significant change has occurred in recent decades, causing a shift from traditional ‘extensive’ towards more ‘intensive’ water policies.

New water policies impact on the equilibria of the water industry through five channels, each threatening traditional forms of public management and pushing towards innovative forms, either implying the involvement of the private sector or at least the development of more independent and business-oriented public systems.

First, UWS require fixed costs that are for the most part sunk; these costs grow as long as UWS provision becomes more difficult and demand (arising both from service users

and from environmental policy) more exigent. This represents a formidable pressure on growth of the territorial size of water undertakings (in order to share these costs on a larger base of customers) and the outsourcing of activities implying economies of scale or high labour costs (e.g. public works, customer services, billing, emergency management, project and design, RTD, etc).

Second, the increase of technical complexity of water management forces local water management systems to delegate decisions to professionals having the necessary expertise. This leads to the creation of specialized water management organizations, whose belonging to private or public sector follows a good deal national paths and traditions. Specialization and complexity also means that less and less critical inputs can be produced 'on site' and more and more are incorporated into 'technological objects' that local operators will select and purchase on the market. Therefore water operators are required to be in the best position to dialogue with external suppliers of technology, and this in the end, might represent a strong incentive towards corporatization of water service operators and an increasing recourse to the market for the provision of inputs. The value chain of water services includes more and more value added that is produced by specialized firms on the market.

This does not necessarily mean that water operators will themselves be privatized, at least not in the forms of delegation or full divesture: Italian and German municipally-owned water companies, as well as the Dutch water companies or the British Water Authorities before privatisation are well-known examples of water industries that developed within the public sector, though with some sort of entrepreneurial autonomy. At a certain point, however, these pressures might become strong, either because of a more general policy trend in this direction, or because autonomy becomes so strong that public control becomes very weak. The need to engage in heavy sunk costs (e.g. research and development) also requires larger scale of operation and thus weaker control of individual municipalities. The sale of shares to the market, often forced by budget constraints, completes the process, until companies finally behave as private companies, even if formally owned by the public sector.

In other countries, the need for professional skills has led quite early to delegation of operation to private companies, rather than developing the same skills in-house. Peculiar institutional mechanisms might influence this development; for example, in the French case, delegation to private companies was often made necessary by the difficulties that the French law opposes to the creation of local publicly-owned companies and by the difficulty for municipalities to have access to credit (Barraqué, 1995).

The third channel is the financial one. The increasing cost of water services in the present phase is paralleled by the crisis of public finance, therefore ending the traditional way of financing through the public budget. Self-finance through full-cost recovery starts to become necessary; on the other hand, tariffs and prices paid by consumers will serve as a cash flow for sustaining market-based finance, for which the water operator becomes the intermediary.

Once again, this does not necessarily lead to private operation of services, since public companies might also have the capacity to access financial markets; on the other hand, given the high capital intensity of the water industry and the very long depreciation

schedule of water assets, the financial reputation of operators is a crucial part of reducing the cost of capital and finally the cost of water to final consumers. Even if remaining under public control, many water companies have engaged in enlargement of capital to new investors, buyouts and other financial operations opening their property to external investors.

Moreover, the decision to privatize can be ‘political’, in the sense that governments and local authorities might wish to sell property in order to give a signal that eventual losses in the future will not be transferred again on the public budget. Privately-owned companies, from this point of view, will need to achieve a good balance between revenues and costs and therefore will not engage in new expenditure unless they will be able to finance it through prices paid by consumers.⁵

In some other cases, the decision to privatize operators might be in a way or the other imposed by financial institutions, especially in developing countries, where the financial rating of local firms, the trust of international agencies such as the World Bank as well as the lobbying capacity of western water transnational firms were all factors conditioning the lending of capital to the delegation of operation to private companies (Hall, 2001; Finger and Allouche, 2001).

The fourth channel is the ‘division of competences’ between UWS operation and regional water policy. In the traditional model, water management could remain ‘local’ and ‘simple’ as far as external subjects (the state) carry out the necessary actions through public works aiming at making water available at the local level. ‘Water plans’, carried out at the state, basin or regional level, were the policy instruments in which this role of the public sector materialized.

As a result, the water industry is required to play a more important and responsible role, with substantial degrees of freedom; one important consequence is that local water management cannot be considered anymore as a ‘simple’ task within the frame of a publicly-controlled water plan; the water operator itself has to become ‘a planner’, and therefore acquire both suitable geographical scale and vertical integration.

In other words, the task that water service operators have to deliver has more and more to do with decisions at higher degrees of autonomy. While in the ‘traditional’ model public planning provides solutions and decides facilities and investment, in the ‘new’ model asset management, project of solutions, gathering of consensus is more and more delegated to operators, while river basin plans mostly limit themselves to indicating the desired environmental functions (e.g. final quality of the river), leaving water users high discretion regarding the means to reach these objectives.

⁵ The history of British Water Authorities is enlightening. When they were created in 1973, they were required to operate on a cost recovery base; however, charges used to be kept low for political reasons, while significant new investment had to be carried on; so the WA experienced a substantial rise of their debt, what was possible only because financial markets treated this debt as if was warranted by the central government. At the moment of privatising the Water Authorities in 1989, the British government had to write off this debt and absorb it into the public debt, otherwise the whole operation would be a failure (Barraqué, 1995; Rees and Zabel, 2001)

Finally, the fifth channel regards the need of water service management to interact with a larger number of conflicting stakeholders, with stronger emphasis to be put on the demand side rather than on the displacement of new assets and technology. In the ‘new’ water policy network, the ranking of public water services, though still in some way predominant against the others, has lost the centrality it could have in the past. It is not obvious whether ‘what is good for water services is also good for water policy’; urban water users become one among the stakeholders of water policy.

Governance in the water sector becomes more and more a complex exercise, the meaning of the ‘public interest’ less clear and univocal. In many countries, the trend towards privatisation also means the search for a new model of regulation, based on ‘arm’s length’ distance between water regulation and planning versus water service operators, seen as a counterpart rather than as a partner.⁶

Pressure factors and constraints arising UWC in Italy

The Italian case provides an interesting illustration of the above described trends and the related trade-offs and conflicts (Massarutto, 1993)

Over the last 20 years, a far-reaching reform process has invested the whole water management system and consequently of WSS organization.

Italy is an overall water-rich country, where supply for human consumption has never represented a major problem. This is especially true in the North and along the peninsula, with the few areas suffering from water shortage being concentrated in the big islands and some southern districts.

Local availability of good quality resources, easily distributed thanks to gravity, historically allowed water management systems to maintain a local dimension and a relatively low development in terms of industrial and technical complexity; until the 1990s, it was even impossible to have a precise figure on undertakings, which were estimated in the reach of 13,000 in the whole country. However, this very well known data probably overemphasizes the degree of fragmentation. In fact, local responsibility for urban water systems is accompanied by responsibility for the State – and later increasingly for Regions – to provide municipalities with the means for fulfilling this responsibility.

Local WSS management has been thus increasingly wounded into a planning system taking care for all infrastructure required for meeting local needs. The need for water supply plans started to be felt in the 1960s, as a consequence of the rapid urban development growth of the post-war period, and was accomplished through regional plans assigning to each urban area given rights to obtain definite amounts of water

⁶ This does not necessarily imply that independent regulatory authorities are created, as in the British case; rather, it underlines the fact that as far as UWS undertakings become more autonomous and concerned on water service provision, definition and enforcement of water policy requires a more adversarial and formalized regulatory system.

calculated on the basis of the estimated needs; wherever these quantities were not available in the same municipality, state (and later on regional) authorities were compelled to realize and finance transfer schemes, aqueducts and supply facilities. In a following phase, the same approach was adopted once sewage collection and treatment became mandatory and required urban areas to be endowed with appropriate sanitation and treatment facilities; this occurred in particular after law 319/1976, starting water quality protection policies in Italy.

Regional planning can be seen therefore as the counterpart of urban water systems managed by local authorities. In fact it was in the planning sphere that the bulk of capital expenditure was financed (meaning that local finance was able to cover only a small fraction) and where the decisions on infrastructural development were taken.

Urban networks for distribution and sanitation, in turn, remained in municipal hands. In a number of cases – and especially in the urbanized areas of the North – municipalities were able to create own management systems that were capable enough to deal with local problems and develop urban networks. The model of the municipal company (similar to many respect to the German *Stadtwerke*), often organized as multiutilities also dealing with electricity, gas distribution, transport, waste management and other local services) provided quite a successful management system; as in the German case, it allowed cross-subsidies and provided municipalities with a powerful engine for activating infrastructural policies. This model, however, remained for the most part confined to cities, although in some areas, especially in the North, voluntary associations and syndicates of small municipalities in rural or semi-urban areas were also created.

Dualism between regional planning and municipal management, dominance of a supply-side approach (estimated ‘water needs’ as the base for regional planning), financing through the public budget of all new facilities, physical fragmentation of water management systems were the main characteristics of the *ancien régime*.

Poor performance records, overall lack of professional inefficiency and financial unsustainability of this dualistic model became apparent quite soon, and especially in the second half of the 1980s (Massarutto, 1993). Regional planning of facilities revealed a powerful and effective way of starting the process and ensuring a baseline of treatment facilities. Yet its bureaucratic approach, dominated by a culture of public works, construction and engineering – easily exposed to the ‘capturing forces’ of construction industry and suppliers of technology – quite soon revealed to be inconsistent with the need to ensure efficient design and appropriate management of the newly built facilities. Infrastructure development was often considered as an end in itself rather than a way to improve management systems.

Many observers at the time pointed out that regional planning had been quite effective where its local counterpart was a municipal water company with adequate managerial capabilities and enough ‘contractual force’ to impose its investment agenda to the regional planner. Much worse results had been obtained where regional planning met with small, under-staffed and poorly professionalized direct management organizations (for a survey of the debate see Massarutto, 1993).

Another pressure for change arose from the increasing difficulty of the municipal firms

to survive in a world that was increasingly dominated by liberalization of public services, increasing need to self-sustain budgets and reduce costs. Liberalization were considered as a strategy for ensuring that the market could carry on both the task of relieving the public budget and allow the water industry to develop, possibly allowing the most efficient among municipal firms to evolve as players on the national market.

The main pressure factors arising unsustainability of UWS systems before the reform can be summarized as follows (IRSA-CNR, 1999):

- *Availability of resources for drinking water supply* is threatened by qualitative factors in the North and by quantitative factors in the South. Water supplies in the North are relying substantially on underground resources that are increasingly contaminated by agriculture and threatened by the inheritance of unplanned and poorly regulated urban and industrial development during the past decades. In the South, the main challenges regard the need to share storage facilities between drinking water and other uses – what also gave rise to inter-regional disputes⁷ – and the still insufficient supply of many areas especially in Sicily. Peak summer demand for tourism is also representing a pressure arising temporary scarcity problems.
- *Surface water quality* is overall poor. The torrential nature of most Italian rivers makes the comparison with Northern European situation more difficult; anyway, the few water quality protection plans issued by Regions according to the WFD show that the actual situation is quite far from the target of “good ecological status”. This problem is substantially contributed by urban water discharges. The EU Urban Wastewater Directive (Dir. 91/271) is still to be fully implemented and is currently driving the capital expenditure. During the last 30 years, treatment capacity has been rapidly reached 60 per cent of pollution loads but in later years investment has stopped and existing facilities have been suffering from poor maintenance and managing difficulties. The outcome in terms of pollution control has been far insufficient; while stopping (and in some cases inverting) deterioration trends in the bigger rivers, there is also evidence of worsening conditions in smaller rivercourses even in rural or semi-urban areas.
- *Increasing difficulties in rainwater management*, especially in the large suburban areas, characterized by urban sprawl and chaotic development.
- *Low water prices* guaranteed affordability, but in the context of a drastic reduction of available public funds this simply was implying severe underinvestment and incapability of facing any new challenge, while EU directives were calling for a dramatic investment effort.
- *Leopard-skin management system* with many areas of excellence but also very poor performance in other areas. Reproduction of ‘best practices’ and cross-fertilization aimed at exporting good management solutions to under-developed areas is required. Given the centralized financial system, most operators suffered from limited decision autonomy and limited capacity to start the search for new solutions autonomously

⁷ This happens for example in the case of upstream reservoirs located in Basilicata Region and supplying drinking water and irrigation in the downstream Region Puglia. A complex institutional agreement has finally been found between both Regions and the national government (for details see Mazzola, 2005).

Law 36/1994 aimed at a comprehensive reform tackling with these problems. Its basic principles were (Massarutto, 1993):

- *Full intermunicipal responsibility* for public supply and sewerage within geographical areas individuated by Regions (ATO⁸) with the aim of increasing size of management areas in order to redistribute water resources and costs, minimize the need of inter-area transfers, make economies of scale achievable.
- *Vertical integration* of responsibility on the whole urban water cycle under the same authority (inter-municipal agency for each ATO). Basic quality requirements are provided by legislation and regional environmental planning and external regulation.
- To make *professional operation* compulsory through the elimination of direct labour organizations and the obligation for the ATO to delegate a single operator for the management of the whole UWS. Alternative allowed models range from publicly-owned companies to delegation; mixed-venture solutions were also allowed. In all cases, including public undertakings, a contractual approach is required in order to formalize obligations.
- *Full-cost recovery* through charges (although some margin remains for the state to subsidize large projects judged to be in the general interest); the state fixes rules for water prices concerning tariff structure, maximum increase rates and benchmarks to be respected.

More in detail, the regulatory system devises a model in which investment choices are made by the ATO (through the asset management and development plan – AMDP – representing the base for the contract with the operator). Assets are provided as a gratuitous loan for use, while the plan foresees that tariffs increase in order to allow the operator finance the investment levels to which it is committed by the AMDP. There are margins for the operator to renegotiate the AMDP, in the first place through the tendering process, and secondarily through subsequent voluntary agreements during the contract.

Larger scale UWS management and full responsibility over asset planning and operation has the aim of creating self-sufficient management units that can have a better oversight over available resources and feel more responsible for their appropriate management. Individuation of ‘reserve zones’ – water resources that are suitable to be used in the future for drinking water purposes and should be managed according to precautionary principles – is a legal requirement for each ATO. In general it seems possible to single out such resources quite easily almost everywhere, at least from a technical point of view. However, this requires selective limits to development imposed for the general interest of the ATO.

The ATO system is also conceived in order to allow market-based financial mechanisms, leveraged by water tariffs, to carry on the burden of investment. Regional planning, following this design, would concentrate on environmental regulation and framing of long-term investment strategies. Larger scale is also conceived in order to alleviate the impact of water prices by keeping together areas with different marginal costs of supply

⁸ ATO is the acronym of *ambito territoriale ottimale*, which means optimal territorial units.

(especially urban and rural areas, assuming that the main explanatory factor for cost differentials is urban density).

Self-sustainability should also guarantee industry viability and allow investment to restart – both new investment required by the EU and renewal of ageing infrastructure. Privatization and corporatization of water companies is expected to foster efficiency gains and favour an economic rationality in the setting up of asset management and development plans.

In the following years, however, the reform had to face many problems and difficulties. After 11 years its implementation is still on a leopard-skin base, although the institutional transformations are consolidating (Muraro, 2005). All Regions have finally transposed the national framework legislation, but this required many years. The number of ATOs that have completed the necessary steps (constitution of the agency, check-up of existing systems, issue of the AMDP, choice of the operator, contract) is currently below the 50 per cent of the total.

In the meanwhile, UWS reform was also affected by liberalization policies affecting public utilities (in general) and local utilities in particular. The reform of gas and electricity industry, in particular, created the opportunity for many municipal companies – as we said, in many cases they were organized as multi-utilities – to act as players in the new liberalized industries. Either forced by legislation or building on their own business capacity and assets, the most dynamic companies started a repositioning process that is still taking place. Transformation into private-law establishments, mergers (mostly on a territorial base), quotation in the stock exchange, vertical integration (e.g. through the acquisition of power generation facilities or bulk gas import contracts), diversification (e.g. towards telecommunications and other market activities) are some of the most distinguished trends (Vaccà, 2003). While allowing municipal companies to obtain brilliant economic results, these strategies also imply a reduced commitment to invest in local infrastructure development; the water sector, characterized by low economic margins and heavy long-term risks due to investment has been one of the first to be penalized (Dorigoni et al., 2005).

At the same time, the national government – also pressed by the EU – has engaged in a reform of local utilities that was clearly oriented by a liberalization design (Massarutto, 1999). Project laws on compulsory competitive tendering for all utilities – including water as well as waste management as the most likely candidate - were nearly passed, and finally blocked or weakened due to fierce resistance of local powers. Three legislative reforms have been passed between 2000 and 2003 (Bognetti and Piacentino, 2005; Robotti, 2002; De Vincenti, 2005).

In the actual legislation – still exposed to pressures to change in the direction of further liberalization – municipality maintain the possibility to directly entrust own undertakings only by following the strict criteria of in-house provision;⁹ otherwise, a competitive

⁹ 'In-house provision' is an EU term for undertakings of any legal form, provided that municipalities have the same degree of control that they would have on their own offices; and provided that the concerned undertaking is delivering the substantial part of its activity on behalf of the owner local authority.

tendering process must take place, even if the company is participated by the local authority. Tenders may regard delegation, as well as the choice of private partners in municipally-owned companies. This latter mechanism was used for example in the first ever tender implementing law 36/94, in the ATO of Arezzo in Tuscany, where the French multinational Suez (with some local partners) finally won the tender and become co-owner of the company (de La Motte, 2005).

A new model for providing UWS: challenges and trade-offs

The management system before the reform was clearly giving origin to unsustainable trade-offs. It was unable to guarantee adequate appropriation of resources for future urban water supplies and to avoid segregation problems caused by diffused pollution and externalities. Management system seemed unable to ensure viability and economic efficiency of the water industry.

The new model aims at providing a sustainable and economically viable solution, and was welcomed at its appearance by an overwhelming consensus. After eleven years, however, its implementation is still lagging behind.

The reasons of this delay have often been deemed as transitory and reduced to simple 'technical' problems. Many observers have blamed local authorities unwilling to give up privileges, municipal companies reluctant to abandon their captive markets and the related monopoly rents, the incoherence of regulatory behaviour (at least once it came to allowing price increase), etc. Our point is, instead, that the policymaker has dramatically undervalued the political and institutional dimension of the governance problem of reform design and implementation; this neglect, if not adequately resolved in the future, could seriously hamper the potential benefits of the reform.

We can use the governance issues framework outlined above in order to elaborate on this, and later on to extrapolate some insights on future sustainability of the reformed system.

First of all, concentration of management systems into the ATOs has raised *status* issues representing a formidable obstacle that has blocked achievement of consensus for many years, and is still causing tensions and conflicts within the ATOs.

An example of status issues is the designation of reserve zones, just cited, where some municipalities are forced to impose restrictions on local development for the sake of safeguarding resources in the interest of the whole ATO; these restrictions cannot be compensated (unless through general measures such as rural development plans; these measures, however, are not managed by the same authorities being in charge for water policies).

More generally, converging into compulsory intermunicipal agencies is a process in which loss of autonomy over service organization and tariff setting is causing many redistributive effects. These do not only regard decisionmaking and tariffs, but also more practical issues, as for example the need to define common criteria to evaluate assets that municipalities will have to put in common. Some of them had old and ageing assets while others were new; some of them had spent their own money while others had

been largely subsidized, and so on. Governance structures of the new boards require complex balances between larger urban areas and small municipalities, whose weight in terms of population is usually smaller. Regions – in charge of defining ATO's governance rules – have introduced complex mixtures weighing on the number of municipalities, surface, population and so on.

The second category of trade-offs regards *legitimation and democracy*, and is directly linked with the setup of the regulatory framework and the choice to move away from public finance systems.

As we noted above, the institutional system created by 1.36 is not fully consistent with the kind of development – both in industry strategy and liberalization policies – occurring in the present phase, since the latter would call for a more flexible but firmly adversarial regulatory approach, while the existing one is dominated by rigid *ex ante* norms (contracts, tenders, price regulation formulas) and is subject to collaborative discretionary renegotiation.

Even if the preferred option that municipalities have adopted so far is that of the mixed venture publicly-controlled company, in fact these undertakings are becoming much more autonomous from local strategic control. They grow in size acquiring a much larger scale than that of the original municipality, whose individual weight declines; the entrance of private partners or the stock exchange is another factor enhancing the business-like nature of former municipal companies.

Privatization, even in this relatively soft version, is often presented as an undue sale of assets of public property aimed at allowing private profit from the provision of essential services (Somma, 2003). So far, this has resulted in more active campaigning without too strong opposition; yet the big challenge will be to face people reaction when the privatized water industry will have to face the first critical decisions.

In the present phase, while public reaction to privatization seems overall not very strong, the main problems seem to lie in the institutional sphere and in the regulatory model. Weakness and inconsistencies of the regulatory system have to be underlined. There is an evident lack of regulatory devices enabling local authorities to engage in a more adversarial relation with the UWS operator, especially if this relation is conceived for the long term (twenty to thirty years of concession are the norm) and operator is charged with investment responsibility. Ex-ante regulation, based on tenders and contracts, very soon revealed to be ineffective as a means to renegotiate contract obligations. Risk of regulatory capture is evident; but there is also a corresponding risk that municipalities will not fully remain committed to maintain business viability after the contract has been released. If this occurs, the water company takes the risk that the recovery of its sunk costs will not be allowed once the assumptions of the original AMDP will reveal wrong.¹⁰

¹⁰ An example is provided by water consumption levels. In order to maintain the price per cubic meter low, many AMDPs foresee a significant increase in per capita water consumption. Contracts do not usually guarantee that the total revenue will match costs. In many cases, water companies have not been able to obtain the foreseen revenues since demand did not actually grow so much; but municipalities were reluctant to consider this as a case for renegotiation.

It can also be questioned whether asking a private to carry on investment plans that have been designed in detail by local authorities is the best way to ‘delegate’ investment responsibility. In fact the risk for the water company is reduced (since investment level are clearly indicated in the contract and further investment would need renegotiation), but also increased (since there is no guarantee that the choice made has been really effective and efficient, and the company before the tender is not in the best position to assess its validity).

These difficulties at the moment are causing obstacles and delays. Investment has not started according to plans, takeover of responsibilities slower than expected. With no surprise, systems that could count on a previously established management structure continue to perform substantially better, but with the serious risk that formerly public, now semi-privatized water companies, also engaged in development strategies in other sectors, are left free to ‘forget’ the local water system, while they continue to enjoy an information monopoly that makes ATO enforcement less effective and credible.

Many observers have underlined that the ongoing evolution is quite contradictory: while promoting market development and competition, it creates strong obstacles to the overall transformation that municipal companies had started autonomously (Massarutto, 2002; Drusiani et al., 2004). In fact, mergers and partial privatization have favoured an overall development of the local utility industry between 1995 and 2005, but this was also favoured by the fact that municipalities still could maintain degrees of freedom in the choice of the organizational model. The rigid model based on the alternative between “in house” and tendering has the paradoxical effect of bringing once again in vogue the management models that the previous reforms had tried to get rid of. Fearing the risk that tenders would force them lose control over water utilities, most ATOs are now favouring the creation of brand new 100 per cent public water companies operating at each ATO level; the future relations between these companies and the former municipally-owned companies, now partially privatized, are still unclear.

A third category of issues regards *patterns of risk allocation* that are implicit in the chosen regulatory model. In the economic literature there is a broad consensus on the idea that in order to provide the base for efficient tendering, investment responsibilities should be relieved from the operating company. This is in fact what ATOs try to do with the very detailed AMDPs they use as the basis of tenders and contracts; however, this reproduces the same dualism between operation and investment planning that law 36/94 aimed at eliminating. On the other hand, as the world experience shows, placing investment risk on operators is feasible at acceptable costs only if adequate degrees of flexibility are allowed by the contract and if market risks are substantially reduced (Massarutto, 2005). This remark has found a nearly immediate empirical proof (Drusiani et al., 2004). Immediately after the first tenders and service assignments, most ATOs have met unexpected difficulties in the management of the approved AMDPs and relations with water companies. After the contracts were released many water companies discovered that economic and technical assumptions on which they were based had to be substantially changed, and this gave origin to conflicts in particular where the water company had been significantly privatized.

Evolution of regulatory institutions, framed by law 36/94, was dominated by the idea of delegating managing responsibilities, from operation to investment and asset planning, to

water companies. The AMDP, first issued by the ATO and later renegotiated with the water company, was quite obviously implying a direct relation between both actors and a collaborative regulatory framework. On the other hand, this is made increasingly difficult both by the strict legal requirements for tendering and adversarial contracting out, and by the increasing distance – in terms of strategy and behaviour – of former publicly-owned companies, now clearly oriented to the open market and quite unwilling to sacrifice their economic margins in order to accomplish local water policy agendas. Often municipal officers feel the contradiction of being at the same time members of the shareholders' assembly of water companies and of the boards of the ATO, with the conflicting pressures of maximizing company returns, consumers' welfare and long-term sustainability.

Such a mechanism could encourage local politicians to sacrifice sustainability, being pressed at the same time by the need to avoid service price increases maintain economic viability of the companies; this also allows municipalities to alleviate their budget crisis through dividends, capital gains and eventually company sales (Dorigoni et al., 2005). Long-term investment is thus the best candidate for the sacrifice, since the time horizon of public decisionmakers is constrained by their electoral mandate.

Many municipalities are now trying to avoid this problem by creating own asset ownership companies that rent facilities to water companies in exchange for concession fees that can be calculated on the base of asset value. This solution is regarded as a practical way out of the dilemma, since it can at least guarantee that cash flows originated by depreciation of assets come under the control of municipalities (Fazioli and Matino, 2003). On the other hand, there are obvious counter-indications: if final prices do not change, the net loser is the shareholder of the water company (sometimes the municipality itself, but often also the private partners to which shares have been sold on the basis of a business plan that did not include a fee for the municipality). Yet the major risk lies in the fact that asset ownership companies could be tempted to play a stronger role, not limited to financial management of assets but also extended to design and investment decision. This is not to be welcomed, since it would reproduce once again the dualism between asset management and operation that l.36/94 appropriately had tried to eliminate (Massarutto, 2005).

A fourth issue, finally, is related to *allocation of costs*, and regards the actual capacity of the existing mechanism to transfer the finance of the UWS on tariffs without causing substantial tensions and conflicts. In fact, the lack of evident conflicts in the present phase can also be attributed to the fact that the change really perceived by final customers is still very limited. What will happen once the water prices will rise up to the cost-recovering level? The next section develops a first exploratory analysis of this issue.

Implementing the WFD: the first challenge for the privatized water system

In order to provide a first explorative answer to the this question, we have made a simulation based on the ongoing experience in two Regions – Emilia-Romagna and Lombardia – that have been among the first to complete the regional planning documents implementing the EU water framework directive, and allow therefore a comparison between actual situation and what would be expected to be the system's performance.

The study has been originated by the legal requirement posed on Regions by Dlgs 152/99 to set up an action plan aimed at implementing requirements of previous directives (with special focus on 91/271 and 91/676) as well as achieving GES (thus anticipating the WFD, though with some inconsistencies).¹¹ Thus, the action plan contains either obligatory actions or discretionary ones. Economic assessment of the action plan is also required, although the approach chosen was far from a real cost-effectiveness analysis (much less a cost-benefit analysis), since scenarios and action plans were individuated by regional technicians after a simulation made out of hydrologic models, and economic analysis could intervene only in the last phase for assessing costs. Therefore, no real trade-off of alternative scenarios and actions was possible.

A second limit lies in the fact that only structural actions (new treatment facilities and connection to sewage systems) could be modelled in some detail, thus achieving a reasonable approximation of final costs; other actions could be assessed only on the base of literature data and very simplified models.

A third limit – indeed acknowledged by both Regional plans – lies in the fact that the envisaged plan is only a starting point towards GES, since there is no guarantee that the foreseen actions are sufficient to achieve it in all cases. This phase of the planning process is conceived as a first selection of actions that apply in a general way to all water users, while ad-hoc actions will be singled out in a later phase in basins that do not achieve GES. For this reason, the plan also lacks a proper individuation of criteria for deciding about how ‘disproportionate costs’ have to be intended.

A fourth limit lies in the fact that models operate in a deterministic way and are based on average situations; the impact of short-run problems (e.g. temporary water shortages) is not considered, nor are specific actions foreseen in order to cope with emergency and temporary problems.

With these limitations, the action plans individuate two categories of actions:

- Structural actions: improvements in the existing sewage treatment, reduction of leakage in both household supplies and irrigation, reuse of treated effluents for agriculture and industry
- Non-structural actions: increasing minimum flows, reducing licensed abstractions from rivers, introduce cleaner technologies in industry and codes of good practice for agriculture and livestock breeding, relocation of discharge points.

The related costs are individuated both in total absolute terms and with respect to the actors that are materially required to pay for it. Thus for example infrastructure cost regarding the WSS system is translated into water price increases for consumers; those regarding irrigation networks are supposed to be partially subsidized and partially paid by farmers through charges; non-structural actions are normally referred to income losses of economic actors affected.

¹¹ See Iefe and Gruppo 183, 2004, for an analysis of the main divergences from the approach of Dlgs 152 and the WFD.

Table 2 summarizes the main economic indicators elaborated. Scenarios are characterised in terms of institutional arrangements for achieving a greater perequation of costs among areas or at avoiding too drastic increase of water prices.

The main results, aggregated at the regional level, are summarized in Table 3. As we can see, the sustainability gap is quite pronounced in both Regions but especially in Emilia-Romagna (where a larger amount of investment has been made in the past); conversely, the additions required to the existing system are comparatively greater in Lombardia.

In both Regions, the starting point shows a substantial gap between water prices and actual full costs. Overall, a significant increase of the water price is expected (up to 120 and 150 € per capita/year, with significant differences among areas). The most relevant determinant of this cost can be individuated in pipelines rather than in treatment facilities, with a dramatic increase in rural and less concentrated areas. Overall, the total cost of planned actions can be quantified in 101 million euros/year for Emilia Romagna and 588 million euros for Lombardia). In terms of affordability, the overall cost remains below critical thresholds on average (around 1 per cent of average per capita GDP in all cases); on the other hand low-income families can suffer a much higher impact, that in some districts has been estimated in 4 to 7 per cent.

These results are highly dependant on the assumptions concerning capital cost. In the simulations, two alternative values have been considered, for public and private sector indebtment, respectively for new and existing capital assets. In scenario 2 we have simulated the impact of a strict full cost recovery requirement, implying the adoption of the market rate for all assets. The result is striking: the regional averages jump at 1.2 to 1.9 per cent (though remaining below the threshold of 3 per cent);¹² yet average values are problematic in some districts (reaching peaks of 2.6 per cent in some cases). Low-income families in some cases would have to pay little less than 10 per cent of their annual income on water, what would be very difficult to accept. Both indicators show that actions aiming at an inter-district perequation, as well as alleviating the condition of low income families are needed in order to make the policy acceptable. In any case, the increase of water prices will be quite significant and sudden, and will require a careful management on the political side. These results are even more worrying, since the estimate of total costs is probably undervalued, being based on standard costs and estimates; moreover, it does not take into account further costs that are required for upgrading the water supply and sewerage system but are not directly linked to the WFD. Once these considerations are made, the affordability of full-cost recovery is seriously in doubt; this confirms what other authors have noticed in other case studies in other EU countries (Barraqué, 2004). Even in England and Wales the acceptability of FCR has reached a critical limit in correspondence to the need that many water companies have to engage in high investment for replacing existing assets. In some cases this difficulty is at the origin of the creation of innovative financial solutions substantially based on the take-back of ownership of facilities and responsibility on the public sector or mixed public-private entities that take over the ownership of investment and the responsibility for its long term maintenance (Di Domenico et al., 2005).

¹² In the literature, critical thresholds for affordability are commonly considered in the range 1 to 3 per cent (see de Carli et al., 2002 for a review).

Table 2: Economic indicators for structural and non structural actions

	Structural actions	Non-structural actions
Total cost (social cost)	Total full cost of existing assets ¹³	Identification of main use and non-use EF Quantification of main consumptive uses Total value of water for productive uses
	Actual sustainability gap ¹⁴	Total cost depending from actions (broken down by economic sector ¹⁵)
	Differential total cost (per year) of new assets, broken down by single actions	
	Total investment in new assets	
Specific cost (cost to specific stakeholders)	Water price increase (per m ³ and per capita)	Estimated number of dwellings, surfaces and working places affected
	Irrigation water price increase (per ha)	Income reduction for affected firms
Affordability	Total per capita annual expenditure (of average and low-income families)/per capita GDP	
Cost-effectiveness	Cost per unit of target achieved (in terms of reduction of main pollutants concentration)	

Table 3: Summary of main economic indicators

		Scenario 1		Scenario 2		Scenario 3	
		Lombardia	Emilia-Romagna	Lombardia	Emilia-Romagna	Lombardia	Emilia-Romagna
Gap between actual prices and FCR (%)		181	75	354	169	149	75
Average water bill as a % of family income	Average	0.7	1.2	1.2	1.9	0.7	1.2
	Range	0.4 - 1.8	0.8 - 1.9	0.7 - 2.3	1.3 - 2.6	0.4 - 1.7	0.8 - 2.8
Affordability index ¹⁶	Average	3.1	3	4.9	4.8	2.8	3
	Range	1.8 - 7.3	2.2 - 4	3.0 - 9.8	3.4 - 5.6	1.7 - 7	2.1 - 3.8

¹³ Criteria for cost assessment are based on reconstruction costs of existing assets and a depreciation schedule that is coherent with true economic life. For more details see Appendix I and II.

¹⁴ Sustainability gap is intended as the difference between actual full cost of existing assets, calculated as in note 10 and direct revenues from water prices

¹⁵ For agriculture, industry and hydropower the criteria adopted are the same as described in par.

¹⁶ Affordability index = % of water bill on poorer families' income.

The cost of non-structural measures has been evaluated considering alternative scenarios for minimum flow requirements and their likely impacts in terms of reduced irrigated land and power generation. In the first case, the diminution of available irrigation water due to the minimum flow is sometimes compensated by actions aimed at using water more efficiently.

Table 4 shows the expected reduction of irrigated surface, and the related income loss, in some of the district considered. In the finally chosen rule for minimum flow, the expected reduction is contained to 1 to 2 per cent due to the above cited compensative actions.

Overall, the expected cost of minimum flow requirements is of an order of magnitude lower than for infrastructural actions (7 million in terms of reduced income for farmers plus 9 million for water-saving actions that are funded by public contributions in Emilia-Romagna; while in Lombardia the expected impact on farmers is 0, since the hypothesis is that water savings compensate fully the reduction in raw abstractions); on the other hand, this cost is shared by a small minority of actors; farmers affected by a reduced irrigation capacity would entail an income reduction that is low with respect to total irrigated land (€27/ha on average), but much higher for the farmers that are actually affected (the value of being irrigated ranging between €309 and €3,682/ha depending on the crops). It is also interesting to compare this figure with the cost of water-saving actions (on average €37/ha with a range of 5-281). Apparently, reducing water losses is socially beneficial, and would remain acceptable if at least part of this cost would be charged to farmers.

A similar deduction can be made for hydropower, for which the total estimated cost of minimum flows is calculated in the range of €20 to €30 million per year in Emilia Romagna.

Table 4 – Cost of non structural actions – Emilia-Romagna

		€/year (millions)	€/y per ha irrigated	€/y per ha affected	Range (€/y, millions)
Irrigation	Water-saving	9	37		5–281
	Reduction of 1.6%	7	27	1.681	309–3.682
Hydropower	Reduction:	Social cost (€/year, millions)		Private cost (€/year, millions)	
	20%	25.7 - 32.9		18.9 - 25.7	
	30%	38.5 - 49.4		28.4 - 38.5	
	40%	51.3 - 65.9		37.8 - 51.3	

Antonioli and Massarutto (2005) argue from these figures the evidence of a potentially inefficient allocation of water rights between civil and agricultural sector: since the cost of infrastructural actions is much higher, households would be willing to pay farmers for reducing irrigation (and improve minimum flows) instead than paying for further WSS infrastructure. However, the Italian system lacks the possibility for such an arrangement, which is widely diffused in other EU systems (Heinz et al., 2002).

Conclusions

The radical reshaping of Italian UWS can be traced back to various triggering factors, both internal to the water sector (such as the crisis of the ‘structuralist’ model based on infrastructure and supply-side measures) and more general ones (such as the crisis of the public finance and the trend towards liberalization of ‘services of general interest’). It aims at solving some contradictions of the previous model (and the related conflicts); on the other hand, it also changes substantially the allocation of power and responsibilities, and by doing so starts redistributive processes and creates new balances and equilibria. Some social actors gain, some others are net losers – or appear as such. While the capacity of the new framework to solve for the existing vicious circles and conflicts, it starts new problems and conflicts.

Five main issues arise from the analysis presented in this paper: First, the chosen method of financing water investment raises some doubts on its capacity to remain sustainable in the long term. Once all costs will have transferred – including the value of existing assets – the impact on family budget will be significant. Of course this will happen only in the long term, and hopefully by that time economic growth will help compensate this negative effect; savings due to operational efficiency gains can also be expected. Yet the striking differences arising from assumptions on the cost of capital show that in a capital-intensive industry like UWS show the importance of a system that provides the right incentives to invest and allows relieving the private sector of at least part of the investment risk. Achieving cost of capital lower than the market is possible only if public-sector devices are introduced for sharing this risk; if the constraints on public finance are binding, this could be achieved through the creation of ear-marked systems.

Second, it seems clear that huge differences are likely to take place between different ATOs. The assumption that enlarging the management scale at the ATO level would be sufficient for alleviating regional disparities seems over-optimistic. If we consider that Lombardia and Emilia-Romagna are among the wealthiest Regions in the country and their water systems quite less problematic than in other areas of the country, this seems even more a worrying prediction. Mechanisms for redistributing the cost burden at the regional or basin level seem appropriate; at least, we need to consider that the actual assumptions are derived from plans that are still insufficient to meet the WFD requirements. Further actions could be financed through a more equilibrated allocation of costs.

Third, it seems that infrastructural actions – while unavoidable and for sure needed – are not enough; while further steps towards the achievement of WFD targets will require demand-side measures that involve other water users. The paradox seems to lie in the fact that these actions at present have a far lower marginal cost – one order of magnitude lower; but they are politically difficult to adopt, since their burden would fall on

concentrated areas and economic categories. The individual economic impact would be much higher, while infrastructural action, even if more costly, have a lower individual impact since they can be averaged out on a large number of customers. The system is still dominated by infrastructural approaches and sectoral solutions, despite some evidence starts to appear showing that this strategy is both insufficient and inefficient.

However, it would be more convenient for the society as a whole to use the first measures. In other countries, the dilemma is pragmatically solved by allowing urban water users to compensate farmers or industry for the economic impact of the action – be it reallocating water rights on cheap resources or paying farmers for abandoning polluting cropping systems or reducing livestock concentration. Another example could be the creation of ear-marked budgets, partially financed by the water bill, for covering the cost of rehabilitation of polluted sites.

Fourth, there seems to be some inconsistency between the regulatory system devised for water services and the implementation of environmental regulations. AMDPs on which water services have been contracted out do not incorporate any requirement arising from the WFD; in the best cases – not in all cases – they include just requirements arising from the UWWD, and also making optimistic and conservative assumptions over the interpretation that Regional plans will adopt. Consequently, introducing the new requirements in already existing contracts will require renegotiation, while both ATOs and water companies, for different reasons, might be reluctant to add new obligations arising in new investment and tariff increase.

Finally, an overall contradiction emerges between the approach to liberalization – mostly based on competitive tendering – and the evolutionary path that is more often followed at the local level, based instead on the evolution of former public monopolies into privately participated ones. Uncertainty of the regulatory framework and its patent difficulty in managing long-term issues and investment responsibilities in particular represent a serious risk that the whole construction, despite its sophisticated articulation, will fail to deliver what it was mainly intended – namely, modernization of UWS systems, maintenance, replacement and new investment face to the new challenges imposed by EU regulation. These considerations allow us to anticipate the likely ‘urban water conflicts’ that will characterize the Italian system in the next years.

In any case, the underlying economic cost is much higher than anticipated in the first AMDPs and will impact heavily on family budgets in the medium-long run, with substantial disparities between ATOs and Regions. Systems aimed at reducing long-run costs and achieve a more equitable sharing will probably be necessary in order to maintain social and political consensus.

Privatization, or at least increased managerial autonomy of water companies, is taking place without the capacity to develop a regulatory framework that is coherent with it. Many municipalities give signals of their willingness to go back to direct public management schemes just in order to avoid regulatory problems that the actual system does not provide them with the means to solve appropriately. But the fear is that traditional public governance schemes cannot anymore guarantee adequate strategic supervision and performance control.

If these trade-offs will not appropriately dealt with in the next phases of the reform implementation, the likelihood that the new system will actually delivered what is expected in terms of investment levels and overall improvement of efficiency and management capabilities will remain questionable.

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Infrastructural commercialization and uneven development: The case of East Germany

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Introduction

With globalization, processes of ‘shrinking’ have gained importance in many cities and regions of the developed world. While many cities in the developing world are still growing, old industrial centres in the United States (Detroit), Europe (Manchester, Leipzig) and Russia (Ivanovo) have suffered from economic decline and significant population losses (Oswalt, 2004). In the social science literature, shrinking is described as a three-dimensional phenomenon (Hannemann, 2003). First, it means deindustrialization: old industries decline without being replaced by modern services, i.e. the economic base of a city or a region erodes. Second, there is a declining population size, resulting from outward migration and a birth rate that is lower than the mortality rate. Thirdly, shrinking is characterized by suburbanization, leading to a socio-spatial differentiation between declining core cities and former residential areas on one hand and growing or at least stable suburbs on the other.

The shrinking of cities and regions has major consequences for networked infrastructure systems, which were priorly designed for satisfying the demands of a growing population under conditions of economic growth. Now they have to cope with exactly the opposite conditions, which paves the way for major, albeit contested, transformations. The latter are accelerated by the growing commercialization of infrastructure provision, which Bakker calls the ‘introduction of markets as allocation mechanisms, and the introduction and elevation of the profit motive to the primary goal’ (Bakker, 2003). In turn, infrastructural transformations may affect socio-spatial development insofar as

deterioration or an increase in price of infrastructure provision reduces the profitability of economic activities and worsen the living conditions of significant parts of the population, thereby making a city or a region even less attractive.

Despite these interrelations, infrastructure reorganization and spatial shrinking in regions have largely been neglected by the social and regional sciences. In this paper, we analyse the shrinking of cities and regions from the perspective of infrastructural restructuring. We do so, first, through a critical review of two bodies of literature: one on shrinking and the other on splintering urbanism. Our core argument is that each one suffers from neglecting the findings of the other, and that a combination of the two can shed new light on important societal processes and contribute to new theoretical insights. Second, we report on some findings from the investigation of water and wastewater systems in East German regions, with special attention to Brandenburg and the Frankfurt/Oder region on the Polish-German border.¹ At issue here is to what extent the restructuring of networked infrastructures is not only an expression and a result of shrinking but also the very medium through which socio-spatial differentiation processes and shifts in the forms of urban and regional governance take place. The last section discusses the conceptual improvements of the empirical analysis for the splintering urbanism approach.

Splintering and shrinking

Social science research on networked infrastructures was conducted for a long time primarily within the concept of Large Technical Systems (LTS). This is due to the specific strength of this concept: to avoid the trap of technological determinism without falling into a socio-centrism and to conceptualize instead the development of infrastructures as a socio-technical process (Hughes, 1983; 1987; Mayntz and Hughes, 1988; Coutard, 1999; Summerton, 1994). Notwithstanding this merit, there is an important deficit that characterizes the LTS approach: space, as an analytical category, is often neglected. In many investigations, the national scale is ‘naturalized’. And even if scales like the European or the global ones are taken into account, there is an obvious deficit in dealing with the local or regional scale (see as a notable exception, Coutard et al., 2005).

This is where the splintering urbanism concept comes into play. Within this approach, infrastructural change is conceptualized as closely connected with spatial developments. More precisely, urban development is investigated in its interactions with the restructuring of networked infrastructures (Graham, 2000; Graham and Marvin, 1996; 2001; Guy et al., 2001; Offner, 2000), which are seen to have a basic, often underestimated importance for urban life. They organize the ‘perpetual process of transformation of nature into city’ (Kaika and Swyngedouw, 2000). Furthermore, utilities often belong to the largest local and regional enterprises, thus being important employers, real estate owners and investors (Marvin et al., 1999). Recently, using a

¹ These findings are the result of the research conducted in the framework of the spatial analysis part of the project ‘NetWORKS: Socio-Ecological Regulation of Network-Related Infrastructure Systems’, funded by the Federal Ministry for Education and Research. Besides Frankfurt/Oder, we also investigated the spatial dimensions of infrastructural transformation in Munich, Hannover and Berlin.

splintering urbanism approach, one can observe an unbundling of networked infrastructures: an organizational and technical segmentation of formerly standardized systems that often goes hand-in-hand with the privatization of the profitable parts of infrastructure systems, whereas the less lucrative segments remain under control of the (local) state. On a symbolical level, this means that the promise of universal access, as represented in the 'modern infrastructural ideal', is no longer upheld.

This process is seen to have far-reaching spatial implications: On the one hand, privileged places like the financial and business districts of global cities, called 'premium network spaces' or 'hot spots' of infrastructure provision, are closely connected by highly efficient infrastructural systems, which, on the other hand, bypass marginalized places like poorer residential or old-industrial areas ('cold spots' of infrastructure provision), often situated in the same cities. Infrastructural transformations thus become a means of socio-spatial segregation or urban splintering (Gandy, 1997; Moss, 2003; 2004; Speak and Graham, 1999; Summerton, 2004).

A splintering urbanism approach offers a new and fascinating perspective on processes of urban change. It not only sheds light on the 'invisible city' of networked infrastructures by focusing the processes of their social production, but also shows how infrastructures themselves shape societal processes and power relations by their specific materialities and symbolic meanings. It is a ground-breaking approach that inspires empirical research on infrastructure and urban development. From our perspective, however, there are at least two points where further conceptual work has to be done. First, the splintering urbanism approach seems to suffer from a kind of 'anglo-american bias', insofar as it sometimes suggests a sharp break between a Fordist and a neo-liberal mode of infrastructure provision. This certainly applied to the situations in Thatcherist Britain and the United States under Reaganomics, but it does not necessarily apply to the experiences of countries like Germany, where neo-liberalism had more problems breaking up the inherited spatial and institutional constellations and societal power relationships of Fordism. Neither does it grasp the infrastructural transformations in many developing countries, which never came as close to the realization of the 'modern infrastructural ideal' as did many countries in the developed world (Coutard, 2002). This being the case, it is important to pay more attention to the variety and complexity of infrastructural transformations.

Second, the study of splintering, until now, has focused on the urban scale, whereas the regional scale in general, and marginalized rural areas in particular, have been largely neglected. However, as empirical work, such as that done on Swiss mountain regions, has shown, infrastructural transformations with major social consequences also occur in rural areas (Abegg and Thierstein, 2003; Thierstein et al., 2004). Thus, it seems necessary to expand the scalar focus of the splintering urbanism approach and to take into account the experiences of rural areas and smaller cities in marginalized regions, too. It is against this background that a conceptual link between the literature on splintering and the literature on shrinking promises to be of particular interest.

Like the research on splintering, the study of shrinking is a rather young body of research. Back in the late 1980s Häußermann and Siebel (1988), when facing the decline of old industrial regions, tried to orient urban sociology towards shrinking processes. But research on shrinking in Germany developed only when the erosion of the economic

base of East Germany and the high population losses during reunification could no longer be ignored. This was the case in the second half of the 1990s. Research results published since then converge on the assessment that East German development has to be conceptualized as a structural break, which, in contrast to West Germany, did not bring forth a 'post-industrial' economy but rather produced deindustrialized or 'de-economized' landscapes (Kil et al., 2003; Engler, 2002; Hannemann, 2003). Of course, one cannot simply generalize the East German experience. Therefore, those who warn about rashly replacing the growth paradigm by a shrinking paradigm in urban and regional sciences and planning are right (Häußermann, 2005; Hesse, 2003). But in view of an expected population loss in East German cities to the order of 25 per cent by 2025 (Krautzberger 2001) and in view of similar processes in other old industrial centres in Europe, North America and Asia, 2004), the assessment that shrinking is an increasingly important mode of spatial development within the fragmented geographies of post-Fordism sounds quite convincing. It is exactly here where the specific merit of the research on shrinking cities and regions lies: to conceptualize shrinking not as a deviation from the 'normal' case of urban and regional growth, but as a spatial dynamic in itself.

In this framework, empirical work up to now has addressed the consequences of shrinking for social infrastructures like schools, kindergartens or medical care (Muschwitz et al., 2002) or for housing and urban renewal (Kabisch et al., 2004; Liebmann and Haller, 2001). Furthermore the possibilities of mobilizing social capital as a strategy to cope with the problems generated by shrinking have also been explored (Bürkner, 2002; Hannemann, 2002; 2004). The interaction between shrinking and the transformation of networked infrastructures like water and wastewater systems, central heat supply and local passenger transport, however, has not yet been analysed from a social or regional science perspective, although the research conducted by engineers, planners and economists has shown the far-reaching implications that infrastructure systems running on low capacity have for regional development (Kozziol, 2004; Schiller and Siedentop, 2005; Seitz, 2000). The 'critical importance of infrastructure provision' (Guy, 1999) in shrinking regions has yet to be addressed by the social sciences.

Against this background, it seems to be of particular interest for us to explore the process of shrinking from an infrastructural perspective. This promises to contribute, first, to a better understanding of an increasingly important form of uneven spatial development, and second, to enriching the splintering urbanism approach on an empirical as well as on a conceptual level. We pursue this aim by investigating the simultaneous process of splintering and shrinking in East Germany, featuring Brandenburg and the Frankfurt/Oder region.

Spatial implications of the transformation of water and wastewater infrastructures in East Germany: The case of Brandenburg and the Frankfurt/Oder region

East German infrastructure systems between extension and shrinking

Brandenburg, one of the five East German *Länder*, is a largely rural area with 2.6 million inhabitants. As far as its surface area is concerned, it is the largest of the five new *Länder*. However, the its population density is very low. Only two of its cities, Potsdam (the capital) and Cottbus in the Southeast, have more than 100,000 inhabitants. Although Berlin is situated at the very centre of Brandenburg, it does not belong to it, forming a *Land* of its own. The effort to fuse the two *Länder* failed in the 1990s.

The city of Frankfurt, the fourth-largest of Brandenburg, is situated in the very east of the *Land* on the river Oder, which marks the border between Poland and Germany in this region. In the 1970s and 1980s Frankfurt was the centre of the semi-conductor industry of the German Democratic Republic. As such it received major investments and subsidies by the central government. Its population rose from 57,000 in the mid-1960s to 87,000 at the end of the 1980s. About 21,000 new flats were built in this period, mostly in new housing development areas. With the reunification, however, the economic decline of the city began. Most of the 8,100 jobs in the semiconductor works (VEB Halbleiterwerk) were lost. And although there were considerable efforts to found the city's future on its high-tech tradition, e.g. the establishment of research institutions like the Institute for Semiconductor Physics, subsidized by the European Union as well as by the National and the *Land* Government, the erosion of Frankfurt's economic base could not be prevented (Scheuplein, 2002). Finally, in 2003, the establishment of a large chip producer failed. As a consequence of the economic decline, the city lost 22 per cent of its population between 1990 and 2003. In 2025 not more than 59,000 people are expected to live in Frankfurt (more pessimistic prognoses estimate population to fall between 45,000 and 50,000 inhabitants). The decline in population also indicates a severe 'brain drain' of experts looking for work in other regions of the country. This is a result of strong suburbanization, due to the bad image of the city centre and the attractive rural landscapes around Frankfurt (Matthiesen and Bürkner, 2004). Another of the city's disadvantages is its relative proximity to Berlin. The distance between the cities is only approximately 80 kilometres. Given the bad image of the city of Frankfurt as a place for living, many high-income employees e.g. of the new established European University Viadrina prefer to live in Berlin and commute to Frankfurt.

The shrinking process has far-reaching implications on the water and wastewater infrastructure of the city and the region, insofar as it has fundamentally changed the conditions with which actors and institutions in the water sector are confronted. In the first years after reunification, the major task was to extend access to water and wastewater networks: for instance, in 1990 only 53 per cent of the population of Brandenburg was connected to centralized sewerage. Peripheral rural areas with a low population density were especially disadvantaged in this respect, so that in infrastructural terms there existed large disparities between the city and the countryside. Some households were not even connected to public water supply and had to get water from springs. Furthermore, many water and wastewater facilities had become obsolete and did not meet the technical, ecological and sanitation standards of reunified Germany and the European Union.

The large demand for modernization and equalization measures arising from this situation met with a widespread development goal after reunification. The future of East Germany under capitalist conditions was conceived mainly in terms of growth and catching up with the levels of wealth and productivity of the West. Helmut Kohl's dictum of the 'flourishing landscapes' that would replace the socialist desert is possibly the most concise expression of the way of thinking of East Germany development. Infrastructure systems played a crucial role: they were considered preconditions to attracting expected economic and social activities. Therefore, their modernization and extension was seen as a priority and subsidized by national and European structural policy.

Against this background, large investments were undertaken in the first half of the 1990s. In Frankfurt and the rural areas surrounding the city, several new sewage treatment plants were constructed, thereby enhancing the proportion of people with access to centralized water and wastewater networks. However, not all urgent problems of infrastructure provision could be solved. Especially concerning drinking water provision, there is still an urgent need for modernization measures (MLUR interview). Investments were partly miscalculated, insofar as the development assumption did not prove true. Instead of a growing economy with flourishing landscapes, large parts of East Germany in general and Brandenburg in particular faced an economic and demographic decline, and there was a consequent sharp decrease in water consumption (from more than 250 to 105 litres/day per capita). Thus, the optimistic investments of the years following reunification resulted to a large extent in infrastructural overcapacities with some facilities operating only at half capacity or less (Interview BGW and DVGW).²

Environmental and socio-spatial dimensions of infrastructural problems

The case of the sewage treatment plant of Frankfurt, driven by the utility FWA (Frankfurt Water and Wastewater Company), illustrates the dimensions of the problem. When its construction began in 1993, it was designed for 20,000 cubic metres per day. In 1996, the real inflow was between 15,000 to 16,000 cubic metres, and today it amounts to only 10,000 cubic metres (interview with FWA). As a consequence, FWA incurred extra costs to fight the malodour resulting from the facility operating with flow six times under capacity. The amount of water necessary to flush the sewage pipes increased from 1,920 to nearly 12,000 cubic metres between 1999 and 2001 (Koziol, 2004). Efforts to save water are thus impeded, and a strong tension between environmental goals and the technical demands of water and waste water systems has emerged. Constructed in a social environment shaped by a growth discourse, these systems have become a cause of environmental degradation, even if they are quite new and operate on the basis of environmentally advanced technologies. Furthermore, the investments undertaken in the 1990s and the following reduction of water consumption resulted in a high indebtedness for the water and waste water utilities of Brandenburg. It is estimated that the debt of the public organizations for water and wastewater, which form only a part of all Brandenburg utilities and mainly address rural areas, amounts to approximately 1 billion euros. Not surprisingly, the wastewater fees in Brandenburg are 3.31 euros per cubic metre, compared to 2.28 euros on average in Germany (Boecker, 2004).

The economic and environmental problems East German infrastructure systems face under the conditions of shrinking are distributed unevenly among space and social groups. For example, at the margin of many city centres in East Germany, people used to

² Of course, the creation of over-capacities in some places is also the result of corrupt deals. Constructing or modernizing sewage treatment plants was an interesting field for private investors, who sometimes managed to convince a municipality to build (and pay for) a plant whose capacity exceeded the local needs and requirements. But corrupt local state officials also took advantage of the modernization and construction wave in the first years after reunification (see Boecker, 2004).

live in buildings made of prefabricated slabs (*Plattenbauten*), a typical form of socialist housing that today serves as low-cost housing. In many municipalities, several of these buildings have been torn down recently, while others have been modernized, but many still remain untouched. Because of the high vacancy rate in these buildings, the fixed costs of infrastructure provision have to be borne by fewer people, which means that the costs which the remaining inhabitants are confronted with have increased. Taken together, the price of water, wastewater, electricity and long-distance thermal energy in some places is almost as much as rent in these buildings (Koziol, 2004).

In rural areas of Brandenburg, to take another example, households which were connected to central wastewater networks in the 1990s did not only have to pay large sums for their access, but are now also confronted with rising fees. Some of them had tried to prevent the “connection by force”, as they call it, in favour of building small decentralised wastewater treatment plants. However, they failed in court. Now they articulate their protest on a political level, e.g. by forming civil initiatives and demonstrating in front of the building of the parliament of Brandenburg. On top of private households, economic activities in rural areas are disadvantaged by the high wastewater fees which are considered to be a severe negative location factor (Boecker 2004).

In contrast to rural and inner-city areas, suburban spaces are not confronted as heavily with infrastructural problems. This is first due to the fact that suburbanization in East Germany accelerated in recent years and reached a new order of magnitude (Hannemann, 2003). Therefore the pipes serving the suburbs do not suffer from operating at low capacity. Secondly, suburbanization is socially selective. Generally speaking, it is the middle and upper classes that move to the suburbs, social groups who can sustain to finance suburban housing. Drinking water prices and wastewater fees for these groups make up a far lesser share of their income than in the case of the rather mixed population in (peripheral) inner-city districts or rural areas.

As these examples reveal, the problems of infrastructure systems are both a result of shrinking and a means through which the living and working conditions in shrinking can be further deteriorated. In the course of this interaction between shrinking and infrastructure systems, new forms of disparities between core cities, suburban spaces and rural peripheries emerge and replace the old city-countryside dichotomy. Paradoxically, it may be the very universalizing of central infrastructure systems in the form of their expansion to marginalized rural areas that gives rise to new forms of uneven development.

Infrastructural transformation as a catalyst for new forms of governance

In spite of the far-reaching implications of shrinking for networked infrastructure systems, political responses have largely concentrated on housing issues. The most important response in this respect is the urban renewal programme, financed by the Federal and the *Länder* governments (*Bund-Länder-Programm Stadtumbau Ost*). In the framework of this programme, 262 eastern municipalities have worked out urban development concepts as a precondition for receiving subsidies. Although the programme claims to support integrated solutions for the problems posed by the shrinking process, the measures completed so far mainly consist of decommissioning

largely unoccupied houses. As such, it is an expression of the influence of the housing industry, which suffers from the high vacancy rates (Franz, 2005; Hannemann, 2003; interview with PDS). The more comprehensive issue of considering infrastructural problems together with urban renewal has not yet been addressed.

This poses severe problems for the utilities. In contrast to housing enterprises, they do not receive any support within the framework of the urban renewal programme, and worse, the large-scale destruction of buildings additionally confronts them with the parallel necessity to deconstruct their networks, too, or, in the case that the abandoned residential areas were not situated at the end of a service area but between places that still need to be served, to raise expenditures for the maintenance of networks.

The rising costs of the utilities and the high demand for further modernization of water and wastewater facilities, which cannot simply be met by the status quo, paradoxically have paved the way for a further commercialization of infrastructure provision. There is a rather broad consensus among politicians, heads of administration and heads of the utilities in Frankfurt/Oder concerning the necessity of a further transformation of the FWA in order to increase the efficiency of the utility and expand its supply or service provision area (e.g. by exploiting its bridge position in respect to the Polish water market), and thereby enable it to contribute to improving the very precarious financial situation of the city.

Commercialization does not necessarily mean selling the utility or parts of it to a private company. It can also take place under public ownership, as the FWA reveals. The legal status of the utility is that of a limited liability company (GmbH); 90.5 per cent of the shares are held by the city of Frankfurt and the rest by surrounding municipalities. Formally, the supervisory board, composed of local and regional politicians, is responsible for controlling the utility. But as one member of the advisory board admits, he and the other members only get 'filtered information'. And even if he is informed comprehensively, he lacks the competence for critically assessing the information (interviews with PDS and FWA). Decisions are taken by the management of the utility in agreement with some political and administrative heads of the local state, who secure the political support.

Currently, there is a discussion about how to further proceed with the FWA. One option is to sell the utility to a private water company, which would mean taking advantage of a situation in which private firms are prepared to pay high prices in order to enter the regional water markets, which are currently being restructured. Another option is the integration of the FWA into the Municipal Services (*Stadtwerke*), a semi-privatized local company for electricity and heat supply and local passenger transport. This option would go along with an unbundling of the FWA, i.e. the separation between networks and operation, which is expected to save costs and create synergies between the different branches of infrastructure provision. Because this would mean a dissolution of the FWA, it is heavily opposed by the FWA's management. The third and most probable option is to integrate the FWA into the Frankfurt Service Holding, a public enterprise that manages the city's shares in housing companies, hospitals and the Municipal Services. However, this would be a provisional solution, only postponing the choice between a multi-utility company in the framework of the semi-privatized Municipal Services and a separate water company with a strong private shareholder.

Thus a semi-privatization of the FWA is probable. Beyond the still debated institutional solution, this might have far-reaching implications for the possibilities of democratic control. Even now, where the utility is owned by the local state, major decision-making processes are rather exclusive, taking place in an informal grey area characterized by the articulation of a private legal form on the one hand and political and administrative networks on the other. Privatization might further protect the utility from democratic control. As the example of the Municipal Services of Frankfurt has shown, the pressure to raise profits has increased considerably after selling 49 per cent of the shares to two private companies (interviews with Treasurer, Interview Service Holding). Furthermore, privatization would have implications for rural areas served by the FWA. Small villages and settlements with scattered buildings are not attractive to a private water company whose primary goal is the maximization of profit. Neglecting these areas in terms of infrastructure provision or leaving them to the highly indebted municipalities could be the result. Commercialization thus could contribute to further deepening regional disparities. On the other hand, this constellation could also create chances for decentralized forms of infrastructure provision.

According to a head of the Frankfurt administration, the city will be run like a company. But the exact rules on how to do this have still yet to be found (interview with ASWE). Driven by financial crisis, the actors are currently in a phase of experimentation, at the heart of which is the restructuring of the water and wastewater utility and other service areas of the municipality. The direction of the ongoing transformation seems to be clear: future decision-making processes will be more open to market forces, rather than being led by the principles of transparency, democratic accountability and environmental justice. The transformation of infrastructure systems is one of the means through which this 'privatization of urban governance' takes place (Swyngedouw et al., 2002).

'Silent privatisation' – Conflicts over water in Brandenburg

In West Germany, privatization schemes frequently cause strong protest of different actors (trade unions, environmental groups, anti-globalization groups, etc.), and in some cases privatization has been stopped by local resistance. Conversely, in East Germany privatization takes place in a rather silent way. With few exceptions, e.g. Potsdam, there are no campaigns against privatization of former municipal water supply and wastewater sewage companies. Even the post-communists of the Party of Democratic Socialism passively agree or even actively supported privatization plans.

On the one hand, the lack of protest movements reflects the weakness of environmental groups and other NGOs in East Germany; on the other hand, though, it is the outcome of the strong belief of many municipalities that there is no alternative to privatization. Tight public budgets and the urgent need for investment force local East German administrations to look for private investors. The upcoming privatization of the FWA is not a public issue in Frankfurt/Oder: at the moment there are no attempts to form a protest campaign against privatization. But these will eventually spring up once private investment, driven by 'more expensive money', will push water prices up.

Today, a more controversial issue is that of sewerage fees. Associations of house owners complain about the high fees for wastewater disposal, which are so high that they

constitute a 'second rent' for them. In 2000, a hunger strike took place in Briesensee in the Brandenburg *Land*. The inhabitants, including the mayor of the village himself, protested against the connection to a central sewage system, which was five times more expensive than the construction of decentralized sewerage. After four weeks of hunger strike, the Ministry for Rural Development, Environment and Consumer Protection of Brandenburg *Land* agreed to study a decentralized solution for the village.³ But in 2004, in response to the technical staff's resistance, house owners organized a protest camp and a hunger strike in front of the parliament of Brandenburg *Land* against the forced connection to central sewage works (Boecker, 2004).

Conclusions

What are the implications of our findings for further research on infrastructural transformations and for the splintering urbanism approach? We would like to sum this up in four points:

First, there is a need to extend the scale of investigation. Whereas in many cases the urban scale is the most appropriate for investigating processes of splintering and unbundling, in the case of infrastructural transformations under conditions of shrinking we have to focus upon the regional scale in order to grasp the complexity of the picture. As the East German experience reveals, the degradation of core cities, caused by deindustrialization and population losses, and the resulting emergence of cold spots of infrastructure provision (marginalized network spaces) are accompanied by severe problems in peripheral rural areas within the same region and the development of rather stable or even growing suburban spaces (hot spots or premium network spaces). Against this background we see the necessity of a shift *from splintering urbanism to splintering regionalism*.

Second, the integration of rural areas into the analysis stresses that the 'modern infrastructural ideal' is 'more a deeply symbolic construction than a tangible, achievable reality' (Graham, 2000). In rural areas of industrialized countries, let alone marginalized rural and urban areas in developing countries, the ideal invades everyday life only as a vision of progress and emancipation. For the concerned population and the waste water engineers, reunification meant adopting the affluent Western standard of universal connection to networked public services, even in the countryside. In contrast, reality is often characterized by a deficient access to centralized infrastructure systems like wastewater disposal. That does not mean that nothing has changed, because infrastructure provision has always been socially and spatially selective. And indeed, it is not only in Germany that septic tanks are here to stay in low density areas! Indeed, soil filtration technology has progressed in such a way that decentralized sewerage only needs symbolic rehabilitation. However, it poses the challenge for future research on splintering urbanism and regionalism to pay more attention on the *spatially and historically differing constellations of disparities and uneven development*, instead of focussing primarily upon the transition from a universal to an uneven access to infrastructure provision. The distinctive feature of the current, post-Fordist constellation then would be a rise in the

³ See <http://www.eigenheimer.de/grogerhu.htm>.

complexity of disparities, producing the fragmented (patchwork-like) socio-spatial and infrastructural landscape which Alain Lipietz compares to the fur of a leopard.

Third, the emergence of socio-spatial disparities in infrastructure provision in the water and wastewater sector does not take place via the bypassing of marginalized spaces in favour of premium network spaces, as one can observe in other networked infrastructure systems like telecommunications, roads and railroads. In contrast, it is the very attempt to universalize the access to water and wastewater systems that becomes a medium for the development of disparities as well as for a neo-liberal shift in the modes of governance. This is due to the specific materiality of centralized water and wastewater infrastructures: Once established, they cannot be rapidly adapted to changing socio-spatial environments. Instead, their persistence imposes high costs on utilities, the local state and consumers in shrinking areas. They contribute to the further degradation of these areas, giving rise to claims for privatization, further depriving infrastructure provision of public control. Our third proposal therefore is to pay more attention to specific materiality of different networked infrastructures, which, in the case of water and wastewater systems, can result in a *dialectical rather than a dichotomous relation between universalising and splintering*.

Fourth, the experience of East Germany reveals a gap in infrastructure research: there is a need for more in-depth analysis of infrastructural transformations in shrinking as well as in developing regions, taking into account urban as well as suburban and rural areas. In the present state of the art, East European countries in particular have been largely neglected. However, they are of specific interest right now because their networked infrastructure systems can be expected to undergo major transformations in the course of their accession to the European Union. Shrinking processes in Western old industrial regions are still waiting to be explored from an infrastructural perspective. And lastly, there are poor and low-density regions in Mediterranean European countries where centralized infrastructure is not and will not be generalized, while in some northern countries, part of the ecological movement proposes to disconnect houses from infrastructure, in a quest for 'autonomous' sustainability. What seems to be of particular interest are *comparative studies of shrinking and splintering*. They promise to enrich the concept of splintering urbanism with the experiences of an increasingly important type of socio-spatial development, the shrinking city and region, thus contributing to completing the picture of new geographies of infrastructure provision drawn by the splintering urbanism approach. Furthermore they could reveal general modes of infrastructural transformations, socio-spatial selectivity and governance forms in shrinking regions, whose identification is a precondition for shaping the transformation processes according to the principles of environmental justice.

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