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Past and future sustainability of water policies in Europe

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Abstract

The article contributes to a discussion on two global issues on water: water resources management, and water supply and sanitation. Focusing on Europe, it traces the legal roots of current systems in history: as a resource, water is considered as a common property, rather than a market good; while as a public service it is usually a commodity. Public water supply and sanitation technologies and engineering have developed under three main paradigms: quantitative and civil engineering; qualitative and chemical/sanitary engineering (both on the supply side); and the most recent one, environmental engineering and integrated management (on the demand side).

The cost of public drinking water is due to rise sharply in view of the two-fold financial challenge of replacing an ageing infrastructure and keeping up with ever-rising environmental and sanitary quality standards. Who will pay? Government subsidies, or water users? The author suggests that apparent successes with privatisation may have relied heavily on hidden government subsidies and/or the healthy state of previously installed water infrastructure: past government subsidies are still felt for as long as the lifetime of the infrastructure.

The article stresses the importance of public participation and decentralized local management of water and sanitation services. Informing and involving users in water management decisions is seen as an integral part of the 'ethics' side of the crucial three E's (economics, environment, ethics).

The article strongly argues for municipal provision of water services, and hopes that lessons learnt and solutions found in the European experience may serve water services management efforts in other regions of the world.

Keywords: Water as a common property; Public water supply; European water services; Municipalism; Water privatization; Cost recovery.

1. Introduction

In 1984, the French National Science Centre (CNRS) created a section for interdisciplinary studies in urban planning, architecture and society. Through various partnerships in France[1] and in Europe,[2] one of the prominent French laboratories in this field, the *Laboratoire Techniques Territoires et Sociétés* (LATTS), developed an approach to water resources management and water services provision both as comparing various contemporary systems (in several European countries and the United States) and in terms of the historical evolution of water services, looking at developments in major cities during the 19th and 20th centuries. This allows us to sketch a double specificity of Europe in present issues on water policies: both as concerns water resources and water services, the public versus private debate never imposed itself completely. Indeed, the importance of water resources as a common property is developing at the expense of state versus privately owned water, within the environmental paradigm; and public services have evolved into a multiplicity of public-private partnership formulas. Only the UK has adopted full privatisation.

Besides, it appears that in Europe, water management has remained at the local or regional level, where efficiency and political legitimacy are usually adequate. Development of a welfare state at the local level at the end of the 19th century, which we call 'municipalism', was supported by complex inter-territorial governance and cross-subsidy schemes. Local capacity building may be the best alternative to enabling the provision of decent water services to urban populations. This development may indeed be of interest to other regions in the world.

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[1] Such as *GDR Réseaux* (Research Group on Urban Technical Networks, a network sponsored by the French National Science Centre), and others.

[2] E.g. the Eurowater network, initially developed thanks to the support of the Research Directorate of the European Commission. It has produced a work in two volumes comparing water policies in five EU member States — France, Germany, the Netherlands, Portugal and the United Kingdom (see Correia, 1998), and is now a network of independent academics and experts extending throughout most European countries.

2. A 'science, technology & society' approach to city infrastructure

2.1. Developments in France

In the 1970s, applied social sciences in France had been focusing on the changes imposed on urban space and city management by the impetus of the Gaullist central government. In the 1980s, with decentralisation being implemented by the left-wing government, researchers and academics rediscovered the importance of local government. Also, they had to accept that the giant multi-service companies, operating many local services,[3] were not nationalised — conversely to what had been announced — and to give it an after-thought. Thus, after a seminal report by Claude Martinand, a state engineer, (1986), a new theme of research emerged around the notions of urban engineering and public-private partnerships. In particular, a new laboratory was created jointly by the *Ecole Nationale des Ponts et Chaussées*[4] and the Urban Planning Institute of Paris.[5] This new laboratory was the Laboratoire Techniques Territoires et Sociétés (LATTS). The aim of LATTS was to develop a 'science, technology and society' approach to city infrastructure, as well as to large firms engaged in globalisation. Various historical and comparative analyses of urban/national technical systems were developed in collaboration with other research teams in Europe and the United States (e.g., Dupuy and Tarr, 1988). These studies were eventually extended to address problems of large cities in developing countries, and the present crisis in infrastructure financing.

2.2. European water studies

Although most countries had retained the responsibility of service provision at the local level, increasing problems of water scarcity and quality degradation led many European States to develop either regional or national institutions to modernise their processes of water allocation between users. A comparative study of European institutions responsible for water allocation and services provision had already been initiated by the author in order to find out why France had the unique dual arrangement of the six river basin authorities (*Agences de bassin*) on the one hand, and of giant private water companies providing water (and in some cases sanitation) to cities and municipalities, on the other. The author suggested (1992) that both aspects should be examined from the point of view of arrangements in other European countries, and the analysis should go beyond the privatisation debate. In the context of the emergence of the European Union, and water being high on the environmental agenda, the author made a policy analysis (1995) of both integrated water resources management and water services provision in each of the 15 EU member States. The twin issues of allocation and service provision were also addressed in greater detail in a comparative presentation of water policies in five EU member States (see footnote 2). The research process of the Eurowater partnership prompted an analysis of the attitudes towards environmental policy of politicians, civil society and water engineers, and also of the development of institutions for integrated water resources management (Correia, 1998).

2.3. Economics, environment and ethics: the three E's

In a second study for the European Union, called *Water 21*, the same Eurowater partnership addressed issues of future water resources and water services management (i.e., public water supply, and public sewerage collection and treatment), adapting the United Nations definition of sustainability.[6] This involved reconciling economic, environmental and ethical/equity criteria: what has been called the *problematique* of the three E's. This definition encapsulates the important issues in water policy. It is not surprising that the Water Framework Directive (WFD), adopted by the EU in October 2000,[7] calls for the achievement of three broad goals:

- To adopt an efficient economic policy, and approach full cost recovery from water users;
- To rehabilitate, protect and enhance the quality of the aquatic environment over the next 15 years; and
- To make water policies more transparent, and develop public information and participation.

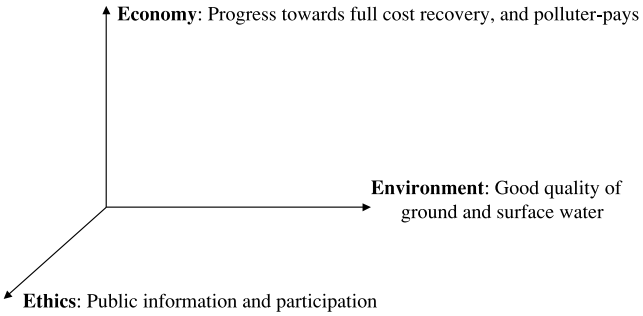

Figure 1. The EU Water Framework Directive goals sketched with the three E's.

[3] Apart from electricity, gas and train systems, already nationalized since WWII.

[4] This school is the oldest civil engineering school in the world (created in 1747); it trains the engineers of the Corps in the ministry chiefly in charge of infrastructure. Mr Martinand is a typical representative of the Corps.

[5] *Institut d'urbanisme de Paris (IUP)*, at the University of Val-de-Marne, Paris.

[6] ". . . development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Bruntland, 1987). Also, development that integrates economic progress, environmental stewardship and social equity. Eurowater decided to extend the social criterion to include political acceptability, involving the issue of democracy and public participation.

[7] Directive EC 2000/60 published in December 2000.

Implementing the three E's, of course, involves several important steps, for instance:

- Designing the hydrographic districts/management units;
- Developing indicators and monitoring systems to evaluate the discrepancy to a given 'state of reference';
- Calculating 'full cost recovery' charges and calculating the present discrepancy; and
- Developing the appropriate forms of public participation, etc.

2.4. Globalisation and privatisation

In Europe as in the rest of the world, the issue of sustainability is becoming intermingled with the general debate related to globalisation. Will better management of both resources and services be reached through public institutions, or through privatisation? Legitimate criticism of large state-run water projects developed in the 1950s to 1970s and related supply-side policies, has fostered a — chiefly Anglo-Saxon — view that emphasised the merits of privatisation and water markets, accompanied by concessions of public services to private companies. However, after a dozen years of excitement, the prospects for these two types of privatisation, do not seem as encouraging as they did at first.

Many years experience leads us to reject the amalgamation of the two issues of privatisation of water resources (opening the way to water markets), and privatisation of water services, because the two do not function within the same legal or economic framework. Besides, developing countries cannot be compared to developed countries, since the former do not possess basic infrastructure, while the latter are facing only the long-term maintenance of an infrastructure already installed earlier.

In addition, we have discovered that, both as regards resources and services, the European experience is quite different from a straightforward confrontation between public versus private, or between state owned versus market regulated. Water resources are increasingly considered as common property, to be shared reasonably and equitably between users, both within member States and internationally. Also, in the water services domain, a vast diversity of public–private formulas blur the traditional dichotomy between regulator and regulated. Let us first summarise the situation of water rights and water administration in some member States.

3. Variations and common traits of water resources management in Europe

3.1. Legal aspects

The last water framework law in France (1992) defines water as part of the *patrimoine commun de la Nation* (common national heritage). This expression can be best translated by the English terms of public trust or common property. In their use of this wording, the lawyers of the French Ministry of the Environment were indeed in tune with a general evolution taking place in Europe, through which the system of rights to use the water would supersede the system of rights to own it, as had been developed along with the *Code Civil* since Napoleon.

3.2. Water as common property

If we look back into the recent history of water rights and administration (Caponera, 1992; Correia, 1998, vol. 2), it is fascinating to note that the concept of common property (i.e., a thing to use and not a thing to own) has been invoked over at least a portion of water resources. This is so not only in the legal systems deriving from Germanic *Volksrecht* (communitarian customary law), but also in those deriving from Roman law. Caponera (1992) explains that, in ancient Rome, where the notions of public domain and private appropriation originate, all water was not placed in either of these two categories, public and private. There was public water (navigable rivers and springs from which cities took their drinking water) and there was private water, or water left to the appropriation of landowners (rainfall that he could catch, groundwater under his land). But the bulk of flowing surface water was considered as *res communis omnium*, i.e. the common property of riparian landowners plus other right holders, such as fishermen. The number of right holders was necessarily limited to this riparianship. This characteristic makes the system close to the riparian rights that existed in the Germanic system. During the Middle Ages, riparian rights were maintained in the feudal system; in England and Wales they were even generalised with the Common Law. In theory, management of this category of water should be left to the community of riparians, with a possibility of control by the State. As Stefano Burchi (1991) has pointed out, the State is more the guardian of the resource than its master. And, even though many countries have reintroduced rights to own water in their laws, they have in practice kept a role for water users in the administration of the resource. With the rise of the environmental movement in the 1970s, this role was expanded, while governments at the same time increased their capacity to regulate both abstractions and discharges. As a result, even in the Latin countries of Europe, where groundwater has been traditionally privately owned by landowners, private ownership of water is becoming less and less prevalent. From the beginning of the 19th century to the middle of the 20th century, there was a trend to forget the common property dimension of water and to found water administration on a public versus private confrontation. However, at the beginning of the 21st century, the paradigm has evolved into more of a confrontation/complementarity between water as a public domain or as a common property. There has been a clear development of subsidiary institutions towards a better, more integrated water management.

3.3. Centralised versus decentralised water management

Without going into details,[8] the following will sketch a roughly two-fold typology of water resources management in EU member States, crossing the Germanic versus Roman (dominant) legal origin with the centralisation/decentralisation tradition. It should first be noted that the only three States covered by river-basin institutions are the same three countries which have been historically centralised monarchies: Spain, England/Wales, and France. In fact it is more complex, since river basin institutions have indeed evolved quite differently.

3.4. United Kingdom

In England, water resources policy has always been highly centralised.[9] Not only was common law developed uniformly at the national level, but the government has always been able to mobilise another rule, that of equity, to ensure that water allocation was equitable beyond the rigidity of riparian rights. In a context of intense exploitation of rather scarce water resources, water administration and water services were centralised in 1974 under ten regional water authorities governing regions that follow the contours of groups of river basins. Fifteen years later, the water industry was privatised, while regulation was even more centralised. This recent evolution places England and Wales quite apart from other European countries, and offers an extreme example of liberalism with central state regulation. Yet, river boards remain, as well as other mechanisms of public participation, even though informal, and uphold a role for subsidiary and common property approaches at the catchment level.

3.5. Spain

Spain seems to be the counterpart of England among the countries in the Roman legal tradition. For the last century or so, the Government of Spain and its engineers have been convinced that the way to develop the country was to mobilise massive amounts of water in favour of small farmers. The authoritarian governments of Primo de Rivera, and later Franco, gradually implemented the hydraulic schemes called *confederaciones hidrograficas*, via river basin institutions, with no public involvement. To allow for the realisation of dams and transfers, all surface water was placed in the public domain. However, the Government was unable to change the private status of groundwater, and farmers increasingly turned to using groundwater in the 1970s, when drilling and pumping technologies became cheaper; finally, after the return of democracy, the 1985 law proposed that landowners should abandon their rights for the sake of developing groundwater user communities. This was possibly prompted by a success story in Prat del Llobregat, near Barcelona.

(Predominantly)	Roman origin	Germanic origin
Centralised	Spain	England
Subsidiary	Portugal Italy	Netherlands Germany

Figure 2. A rough typology of water institutional cultures in Europe.

3.6. Portugal

Like Spain, Portugal also experienced dictatorship, and large hydraulic projects were planned by river basin bureaucracies, but water scarcity existed only in the sparsely populated south. Also, Portugal received less financial help from outside than did Spain. Return to democracy was associated with decentralisation to the local level, but hydraulic institutions were not so favoured. Today, water administration is carried out at the regional (administrative) level, and water planning is effected for 15 river basins or catchments, with user participation. Like Italy, Portugal is then better located in the 'Roman law — subsidiary' box of Fig. 2.

3.7. Italy

As for Italy, the attempts during the fascist period to unify water policy in favour of a compromise between irrigation and hydroelectricity were balanced after WWII by the return to power of various levels of government. The present result is quite complex, with river basin authorities dependent on the administrative level of the territory in which they are located. Those covering the largest rivers and territories of several regions remain the locus of integrated planning between administrative regions who have water planning powers, and with important powers still in the hands of local authorities or their joint boards.

3.8. Germany

In Germany, there is a long tradition of local drainage (*Wasser-und-Boden*) associations, but river basin management has not been institutionalised, except in the famous case of the Ruhr *Genossenschaften*. Because subsidiarity has always been strong in Germany, which even now is a federation, water policy is in the hands of the 16 *Länder* (states) rather than with the *Bund* (federation). Cities as well usually retain important environmental responsibilities, also in the area of water. This leads to a complex governance system with inter-territorial balances of power.

[8] A detailed analysis of the five Eurowater States (being France, Germany, the Netherlands, Portugal and the United Kingdom) is available in Correia, 1998, vol. 2; Spain and Italy were subsequently included in a later analysis, published in French (Barraqué, 2001a, 2001b).

[9] Personal communication with Mr. Simcock, expert in water law in the British Department of the Environment. This is detailed in the chapter by B. Barraqué on water rights and administration (1998a).

3.9. The Netherlands

A complex governance system is also the case in the Netherlands, where the flood-prone landscape historically has led to the development of water-user, or dyke-user, associations — the famous *Waterschappen* (water and drainage boards) dating back to the Middle Ages. The Dutch have historically resisted the development of a central water management administration — even during the occupation of Holland by Napoleon's armies. Important water management roles have remained vested with local authorities and *Waterschappen.* With the recent new trend to integrate water management, the regions, rather than the central Government, have been placed at the heart of the process.

3.10. Nordic countries

For lack of space, we can only indicate that these countries all fall in the 'Germanic — subsidiary' box of Figure 2. Water policies are led by administrative regions, but in Sweden and Finland there are water tribunals operating on a river-basin scale, to solve conflicts between hydroelectricity and other uses.

3.11. France

Now, if we turn to France, it is difficult to place it in any one of the boxes. On the one hand, it is clearly Roman law and centralised; indeed, it might appear logical that France would have centralised water policy and created systematic river basin institutions with broad powers to build and operate hydraulic schemes. Yet what happened is just the opposite. The six famous *Agences de bassin* (water basin authorities) cover the entire country, but they have become subsidiary institutions, with no policing powers, and no right to build and control infrastructure; they have only the right to levy taxes on local users/members so as to subsidise environmentally friendly projects; this remains debated in a country where (fiscal) subsidiarity is unconstitutional (Barraqué, 2000). This system has allowed a movement away from traditionally rigid and non-transparent central-local government relationships,[10] and was furthered by the creation of catchment planning institutions, also based on use rules at more local levels.

3.12. Towards equitable sharing

It is not possible to expand here on each case, but a quick review shows that, in all EU member States, there is growing attention to water, as well as increasing regulation, by central Governments. Simultaneously, water governance is being developed at several levels of government administration, as well as at community level, but with various forms of user representation. Thus the old conflict between state management, advocated for the sake of equality, and privatisation/water markets, championed for the sake of freedom and efficiency, is being superseded. There is increasing recognition that equity, collective learning and reduced transaction costs through community-based institutions constitutes the most practical path to achieving integrated and sustainable water management. It should be noted, that this evolution within the EU member States is quite congruous with the development of a new international conception of water towards reasonable and equitable sharing of international watercourses, as expressed in the 1997 UN Convention.[11] The Convention attempts to reduce the full sovereignty of either upstream or downstream countries over international water bodies (Dellapenna, 2000). Excellent examples of this new thinking are found in Europe, for instance the Rhine Commission, the CIPEL for Lake Geneva, and the more recent Meuse and Scheldt conventions. The Water Framework Directive of the European Union offers an opportunity to generalise reasonable and equitable sharing between users to all European rivers, that is to move away from exclusively government-operated hydraulics and supply-side schemes towards more balanced supply-and-demand management, within each hydrographic district, by local user communities. The role of the State then becomes that of supervisor or guardian of the national endowment.

A parallel evolution away from the public versus private paradigm is also taking place in the field of water services provision. It is unfortunate that the greatly varied European experience is largely masked by the controversial British privatisation.

4. The sustainability of water services in Europe

If we apply the definition of sustainability (given in Figure 1 above as three E's) to water services — including both public water supply and public sewerage collection and treatment — the following three questions must be asked:

- How is capital maintained and replaced in the long term?
- What new investments are needed to improve the environmental and sanitary performance of existing systems?
- Is it politically acceptable to pass full sustainability costs on to consumers, and can they afford them?

[10] This system was named *la régulation croisée* by the disciples of Michel Crozier. See e.g. Grémion (1976).

[11] Convention on the Law of the Non-navigational Uses of International Watercourses, 1997, adopted by the UN General Assembly in resolution 51/229 of 21 May 1997. For the text of the Convention, see UN Doc. A/51/869.

4.1. Economics — how is capital maintained and replenished?

How is the enormous capital, accumulated in water services technologies over the past 150 years, to be maintained and reproduced in the long run? Are current depreciation schedules accurate? How are they reflected in the water bills or charges — particularly as Governments usually phase out subsidies after the initial investment? How does one balance the need to achieve excellent services (with a risk of overstaffing) on the one hand, and economising on staff (and risking poor maintenance) on the other? Can normal maintenance needs be separated from needs arising from replacement of old infrastructure? Tracking water losses is a good example of this search for compromises. There is obviously a maintenance optimum — which is certainly not zero-leaks — and relining leaky pipes is often cheaper than changing them. The question is how much of all this can be covered by water bills.

4.2. Environment — what new investments are needed?

What kind of new investments are needed to improve the environmental and health performance of existing systems, and to comply with current EU directives and national standards? How much will operational costs increase (e.g., with increased volumes of sewerage)? What will be the additional cost burden on water consumers corresponding to rising investment and operational costs, in particular if loans have to bear commercial rates? How far are current national policies from the polluter-pays and user-pays principles, which have been formally accepted?

4.3. Ethics — who pays for sustainability costs?

If all the costs associated with environmental and economic sustainability are passed on to the consumers, can the lower income groups pay their bills? and is a high water price politically acceptable? If not, what kind of technological, financial or social adaptations are necessary? What would be the impact on future generations of today's poor replacement of infrastructure, in terms of higher prices and/or increased health and environmental risks?

4.4. Cost recovery and subsidies

The first two E's, economy and environment, pose a challenge to local governments and water utilities, which in the past received subsidies to set up the initial infrastructure. Now, even though investments to replace ageing infrastructure partly overlap with those to comply with environmental standards, in most countries, they add up to high levels while subsidies are increasingly phased out. OFWAT[12] has estimated that if England and Wales were to rebuild their water services infrastructure completely, they would have to spend £189 billion.[13] Some of these assets can be depreciated over 100 years, but others only over 30 or even 10 years! The issue is, how much should be invested in each period of five or six years? and to what extent can this investment really be covered by consumers' water bills? Other European countries have to do this sort of analysis upon request of the EU Water Framework Directive, but the decentralised and thus smaller administrative units make it more difficult. Many experts think that we are just in the quiet process of 'eating' the initial capital, in particular as regards sewers. In the long run, the amount of investment needed is growing and will force countries to re-introduce subsidies so as to prevent an unacceptable rise in water bills. In a way, this is what happened in the UK. To make privatisation attractive in 1989, the Government cancelled the debts of the previous regional water authorities,[14] and in addition offered a 'green dowry' to help the new companies live up to EU water quality directives. Altogether, these subsidies — as anybody but the Thatcherites would call them — amounted to £6.4 bn. This is more than the French or German Governments have given to their water services over 20 years! But, if subsidies have to be brought in, either regularly or in lump sum, every 15 years, is there any future for privatisation? In her thesis, Karen Bakker (2003) wonders whether British privatisation did not put the water industry into a fundamentally unsustainable state, which will be increasingly felt in the coming years — more than 20 years after it occurred. Some of the water companies are trying to sell their assets to water consumers or regional governments, since they do not want to be responsible for investments that depreciate so slowly.

4.5. Long-term effect of subsidies

In view of the above, the level of cost recovery is difficult to assess. If one wants to check present economic sustainability thoroughly, one has to look back 30 to 50 years. If subsidies are removed now, it will be at least another 20 years before the effect on water prices will be felt. Indeed, the case of the UK might in reality be a model of what is going to happen to all States in the wealthy core of Europe. The situation may become even worse in southern and eastern Europe, where most countries are currently still in the initial investment phase, receiving important state and EU subsidies. This means that prices are far below their cost-recovery level, as they were in the richer European countries at the time of their initial development of water services. Let us try to bridge this century-long process.

[12] OFWAT, Office of Water Services, the economic regulator for the water and sewerage industry in England and Wales.

[13] This figure was provided by the Eurowater partner in England, the Water Research Centre in Medmenham (Dr Thomas Zabel).

[14] Debts had accumulated due to fiscal austerity which led to block the rates paid by water services users.

5. The three stages of the water industry

It is useful to consider here the concept of reverse salient[15] in infrastructures, initially developed by Thomas P. Hughes for the history of electricity networks. The evolution of water services technologies can be sketched in three consecutive stages, separated by crises:

- In the first stage, reservoirs and aqueducts are developed by civil engineers to bring ever greater volumes of water from ever more distant sources. Eventually, this technology came to support national government interventions into large multipurpose hydraulic schemes. But water transfers generate conflicts with other users; also, the water may be contaminated.
- At some point, this technology is found more costly and more risky than pumping water from rivers just upstream of the city and treating it (filtration, and later chlorination, ozone, GAC (granular activated carbon) beds) before distribution; this is made possible by the rise of chemical/sanitary engineering, which also allows solutions to be found to treating wastewater before it is discharged into rivers. This is the second stage — in fact quite supportive of the local character of water services.
- Even the chemical engineering response may be reaching its limits**:** as water quality standards are rising, it is becoming too expensive to produce drinking water from increasingly polluted water resources. This is the third stage, where environmental engineering will assist the movement toward integrated river management, demand-side management, and pollution control at the source.

5.1. Quantitative supply-side policies and water transfers

In the 19th century, or rather until the discoveries of Robert Koch and Louis Pasteur were popularised, public water supply services were developed on the assumption that water should be drawn from natural environments far from the cities. Large cities in particular would have to get water from further and further away. Financially, this was possible because municipalities were able to obtain 'cheap money,' in particular through the popular early savings banks, which they controlled. Municipal bonds were attractive to the public, and on top of it all, governments would subsidise water supply projects. Back in 1859, the City of Glasgow brought water supply under municipal control, as the existing private company was unable to extend service to the whole population. Thanks to a subsidy from Queen Victoria, clean water was fetched in large quantities from Loch Katrine, 55 km from Glasgow, and thus well away from the polluted city (Maver, 2000). Joel Tarr (1996) has illustrated this type of approach in the US — obtaining clean water from far away, and using local rivers as sewers. The latter practice relied on the natural dilution and self-purification power of rivers.

The practice of bringing in water from distant sources, and that of dumping wastewater in nearby rivers, has remained dominant in the New World, and — after WWII — has also spread to the rest of the world. These practises have been facilitated by the simultaneous occurrence of relatively abundant water resources, international financing institutions offering cheap money, and various forms of support for government interventions in the provision of infrastructure — whether Keynesian or socialist. However, the large hydraulic projects of the 1950s and 1960s were increasingly devoted not to cities, but to multi-purpose development, including irrigated agriculture. Still today, many developing countries base their water policy on large-scale water transfers. They thus indirectly subsidise the production of cash crops for export, the motivation being their desire to gain entry into world markets. In some locations, the ceiling of water resources extraction has now been reached and a crisis situation ensued. This points to the unsustainability of past policies. Since long-distance aqueducts cannot be built without subsidies, their operational costs remain marginal and the water, consequently, is both underpriced and inefficiently allocated. This type of situation may currently be witnessed in Spain. After decades of dam construction to regulate rivers, a national aqueduct system is about to be built, while 80% of the country's water is used for irrigation (Vergés, 2002). Since EU subsidies for water are going to be redirected to the incoming Eastern European countries in the next 5 years, the phenomenon of reverse salient may become evident in Spain, as it already has in Italy: new projects are being abandoned, and irrigation districts are eventually reduced to their most profitable sections.

5.2. From quantitative to qualitative supply-side policies

Large cities in western and northern Europe changed path back in the beginning of the 20th century. Rising population densities and shrinking natural resources worked to increase competition for clean water, while the concurrent development of biochemical analysis brought to light serious levels of contamination. As irrigation was not necessary, the main problem here was with water quality rather than quantity: to deal with the sanitary problems, it was decided (by the end of the 19th century) that water should always be filtered. Soon afterwards, chemical treatment was invented: chlorination, ozonisation, UVs, and filtration through GAC beds (around the time of WWI). Large European cities then turned to the rivers flowing through them, extracted water just upstream of their location, and treated it. This technology did improve public health, while reducing investment

[15] A reverse salient occurs when a growth curve undergoes a sharp downward inflexion. Based on a given technology, a system will usually self-support its own expansion until it meets a limit. If another technical system develops, the limit can be removed, but the first system will largely be abandoned.

in infrastructure. That is, investment shifted from the long-distance pipe to the treatment plant. This strategy, however, entailed a considerable rise in operational costs, which in turn gave rise to the idea of having customers pay the operational costs through issuing water bills. Over time, the delivery of water under pressure into private homes reached universal coverage, thus changing the status of public water supply from that of a luxury to an expected standard convenience, while clearly improving the self-financing capacity of utilities.

5.3. The example of Paris

The reverse salient between the quantity stage and the quality stage took place in Paris about a century ago. In 1890, an engineer named Duvillard came up with a fancy project to draw water for the city from Lake Geneva, some 440 km away! This was technically feasible, and the cost was to be financed through a tremendous projected increase in consumption. A per capita consumption of 1000 lcd (litres/capita/day) would also allow for more luxurious fountains throughout the city, and better street cleaning, in addition to increased domestic comfort and hygiene. Besides, once discharged after use, this quantity of water could alleviate navigational problems on the Seine during periods of drought; help flush wastewater from the new sewer system off to the sea; and even abandon local water resources and leave them available for regional economic development. All in all, enthusiasts argued, such a transfer would secure a water supply for the citizens of Paris forever — and the greater the quantity of water, the cheaper the price per m^3! However, while the proponents of the transfer were finalising preliminary studies, an epidemic broke out. It was found that the probable source of contamination was the Loing Springs some 100 km south of Paris. The incident demonstrated that even a distant, supposedly pure, water source could be contaminated. This meant that water still had to be filtered and treated even if it came from far away! In 1902, Paul Brousse, one of the founding fathers of the French so-called 'municipal socialism',[16] inaugurated a new water-filtration plant at Ivry, just outside Paris, upstream along the Seine.[17] A choice had been made that was to last for a long time — it was reinforced when chlorination was installed after WWI. The Lake Geneva transfer gradually lost support, as water demand was growing only incrementally and the big jump in quantity seemed too risky. The project was finally discarded by the Paris Council in 1919 for national defence reasons. It was feared that, in case of war, the Germans might attack the aqueduct and cut Paris off from its water supply. Even though this decision did not avert the next war (are there ever real water wars?), it is clear that investments in water quality gradually replaced those in quantity, as chemical engineering came to join civil engineering as a tool of water management. Both approaches were combined, as illustrated after WWII: after a severe flood in 1953, the Prefect of Seine County (around Paris) took advantage of the emergency mood and obtained permission for the construction of reservoirs upstream from Paris, on the Seine and on its tributaries the Marne and the Aube. The project was in fact designed to increase summer flows in the rivers to so that water demand in Paris could be met even during serious droughts, such as the one in 1976. Three dams were built (between 1960 and 1985), but rising environmental concerns and other concerns of the River Basin Commission forced a compromise solution closer to integrated management. Interestingly, a fourth reservoir with a direct pipe into the city had been envisaged by engineers of the water services of Paris under Mayor J. Chirac (in the 1980s), but the idea was abandoned. The giant water supply companies serving Paris felt that since it was necessary, and also possible, to purify the water supply due to slow improvement of incoming quantity, new reservoirs were unnecessary. In this connection, it is worth mentioning that water demand in Paris declined by 13% between 1990 and 1996 (Cambon-Grau, 2000). This fact seems to indicate that we have moved into a new phase of water supply and service, where the priority is to maintain both the quantity and quality of the raw water, i.e., the third stage discussed above. But what crisis led to this change occurring in many other places?

6. The crisis of municipal water and sewerage services

6.1. Expensive sewers, ageing infrastructure, declining consumption

In France, as in other northern European countries, major efforts were devoted to improving city sewerage collection from the 1950s onwards, and sewerage treatment from the 1970s. To facilitate funding of the necessary investment, it was decided to change the status of public sewerage collection and treatment from an imposed system, paid by local taxes, to a commodity, with the cost being added to the water bills. But in the same period, the public water supply system itself had reached a mature stage, at which it was necessary to renew its ageing infrastructure. However, government subsidies were no longer available. This financial crisis was the underlying reason why municipalities were attracted to turning water utilities into private companies: traditional public accounting practices could neither depreciate assets nor make provision for renewal, while private business accounting could do both. Public water supply services, and later public sewerage collection and treatment, were increasingly covered by water bills under corporate

[16] Equivalent to what was derided in England as 'water-and-gas socialism.'

[17] This plant was redesigned a few years ago to serve as a showcase for French water technology know-how.

management formulas that allowed depreciation and provision for renewal. A direct consequence of this was, of course, a rise in water bills. In the last decade, the influence of economic thought, arguing in favour of full-cost pricing or at least fair pricing, extended to public services, with the correlative phasing out of subsidies. Consequently, water bills rise dramatically, while consumption declines, especially as large-scale users (such as industries and services) do their best to reduce their water use (to cut down on costs) either by changing their processes, or making repairs to prevent leakage. This scenario — especially the reduced water use by larger consumers — explains the recent stagnation in the volume of water sold by municipalities. But in some countries, even household consumption of public water supply has declined, as users change to water-saving household fixtures, redesign their gardens, harvest rain water, and find alternative sources of water for non-drinking purposes.

6.2. Rising cost of potable water treatment

At the same time, water suppliers are discovering that it is becoming ever more difficult to produce drinking water — at a reasonable cost — while guaranteeing that it meets quality standards. The fact that ecotoxicologists are in control of quality standards for drinking water tends to favour the traditional no-risk strategy[18] with little regard for the resulting costs. But are consumers going to accept this extra cost? As criteria for water quality multiply, the situation is becoming overly complex. For instance, it is claimed that byproducts of chlorination cause cancer, and there are many analogous examples. Nevertheless, every year the media report that an ever-growing proportion of consumers are receiving water that does not comply with quality standards. In the long-term perspective, however, the standard of water treatment is rising. One possible solution to the water quality problem may be found in more sophisticated filtration technologies that could be developed by private companies. But drinking water criteria are steadily becoming more complex, and quality standards are raised at regular intervals as new risks are discovered. Thus there is a continuing upward spiral of increased feeling of risk, increased water treatment costs, and associated negative effects on the confidence of the public.

7. Elements of the third stage

A variety of diversification strategies are now being experimented with, and they all try to deal with supply and demand simultaneously: conserving water, making allocation of resources more flexible, using non-conventional sources.

7.1. Maintaining water quality through land-use control

To reduce the risk of the water supply not meeting standards, many providers, along with local, national and EU authorities, are now turning to a new strategy: land-use control. This is achieved through establishing water resources protection areas, and usually means that agriculture in the area is restricted in fertiliser and pesticide use (source control). The policy is increasingly based on farmer compensation programmes. This system may turn out to be cheaper than relying on ever more sophisticated water treatment technologies, and may work to the advantage of the farmers as well.

7.2. Finding cheaper water resources

While there is still an ongoing debate between land-use control and pollution removal, at least large-scale water transfers over long distances are increasingly being questioned (Barraqué, 2000), and contrary to Spanish 'hydro-schizoïd' water policy, groundwater is increasingly used and also recharged (Llamas, 2001). The change from supply-side to demand-side management, initiated in California in the 1970s, has now spread to Europe: it is getting more and more difficult to build dams, because environmental movements have been recently joined by economists and liberals, advocating full-cost payment of water infrastructure by beneficiaries. The new motto, then, seems to be to give priority to conservation and demand management: water conserved by domestic users with the financial support of California water suppliers is actually even cheaper than the water obtained from farmers through water markets and its 'wheeling' through existing aqueducts (Dickinson, 2000). In Europe, there are many examples of planned water transfers that have been cancelled. Copenhagen is not going to buy water from Sweden; Puglia and Bari are not going to get Albanian water; London will have to reduce leaks from city pipes before it can purchase water from Scotland, etc. Desalination now often turns out to be cheaper than long-distance transfers — this is important news for urban development at the sea-side.

7.3. Financing alternatives, cross subsidies and cost distribution

Once municipal water services had been completed, subsidies were increasingly phased out, and maintenance costs started rising. The issue was to reduce the long-term costs associated with borrowing money, and water suppliers or authorities looked for mechanisms to soften the impact on water prices of investments that were heavy and lumpy, although long lasting. This was done in various ways, in accordance with the specific national politics, history and

[18] See Lave (1981). For a history of drinking water criteria and the present result, see e.g. Okun (1996).

culture. Some countries accomplish this by consolidating spatial areas,[19] others through temporal cross subsidies (earmarked funds, water banks, modernisation of public accounting methods to allow depreciation etc.). In Germany, this has been done through the *Stadtwerk*, the single, formally private company, owned by the municipality or joint board, that runs all technical networks in a given territory. This model, based on the pooling of investment needs in water, electricity, gas, public transport, etc., has been criticised by the World Bank, but on the basis of incorrect data. Thus, it should not be dismissed too quickly (Barraqué, 1998b). Lastly, cross-subsidisation in favour of the lower income groups is well known, if not always presented as such. For instance, paying for wastewater collection via local taxes makes this service more expensive for owners of large houses — who are usually richer. Under municipalism, water suppliers were indeed not motivated to study distributive effects, since they wanted the best quality in unlimited quantities to serve all purposes (in a commonwealth vision) and were subsequently led to 'sink' the investment costs. Contemporary water suppliers are still reluctant to study distributive effects too closely. They are usually in favour of 'efficient' pricing and commodification of services, with cost-recovery handled through billing, not taxing. However, the English and French examples show that straightforward consumerisation is dangerous even for water companies, because consumers are usually distrusting the service providers more than they are if approached as citizens, even if it is not through taxes. It has also become quite popular to adopt block tariffs with initial volumes for free or quite cheap, and rising prices with rising levels of consumption. But if these schemes are not carefully studied from a sociological perspective, they may induce quite perverse effects. Moreover, if people save much water, the unit price of the quantity they consume is likely to go up, because investments have to be repaid anyway. The need for demand management is forcing managers to study this aspect, just like any business must pay attention to marketing. The demand for drinking water must be broken down into sectors, including domestic indoor, domestic outdoor, industry, services, etc., and the evolution of each sector must be studied separately. However, this may not be sufficient, and utilities may well have to involve the public in such studies to avoid deepening distrust. In the US, decline in domestic demand is more the result of information policies and subsidies to individual conservation measures than of rising prices alone (Dickinson, 2000). The difficulty is to slow down the pace of change enough to allow people time to adapt to higher water prices which eventually occur.

The recent opening up of the, traditionally closed, public water supply stakeholder-community to a whole range of newcomers, in particular the general public, has made water engineers feel awkward and insecure. But is there any alternative if public confidence in water services is to be maintained within the demand side approach?

8. Conclusion: Are we facing a social reverse salient?

This article suggests that it is the third criterion in the Eurowater definition of sustainability (see Figure 1), namely ethics, including public information and participation, that is the most crucial today. Before the business of providing public water supply had to move into demand management and charge prices closer to real costs, water services were widely accepted by society. But it was because little attention was paid to demand. Water users had blind confidence in the system. Today, cost recovery brings prices up, while drinking water standards are getting stricter, and droughts are increasingly used to frighten people about possible water wars. Due to lack of information, in particular on the difference between short-term and long-term sustainability, and on the real advantages of corporate management, there is a growing distrust among water users towards systems which had reached their equilibrium under the global municipalist (and blind) type of welfare. If we are going to tackle the ethical crisis of water services, we will need more than just an economist's toolbox and good cheer. We need anthropologists, sociologists, historians, geographers, etc. The water supplier for Paris, SAGEP,[20] financed a PhD in anthropology in an attempt to understand the overall relationship that Parisians have to their drinking water (Euzen, 2002). Much is to be gained from this type of approach, if it helps the general public rebuild confidence in the water services.

In Southern Europe, the non-completion of the infrastructure made it impossible to raise prices to approach cost recovery, which has generated irrational allocation. Government subsidised hydraulic schemes clearly reduce the final prices paid by farmers and give no incentives to cities to conserve. The whole water economy is 'pulled downwards.' Indeed, farmers could actually make more money by not working, just selling their water. A parallel situation arose in California and gave rise to so-called 'water markets' in order to gain credibility. A water market would in fact not be necessary, if water resources

[19] Thus, in Britain, before centralisation created the 10 Regional Authorities in 1974 (later privatised in 1989), there had been a sustained process of consolidation going on since World War II. This is also the case in the Netherlands. In France, a similar process is taking place now, as decentralisation has led to the rise of the *département* as an appropriate territorial level to help small local authorities to face growing financial and environmental constraints.

[20] *Société Anonyme de Gestion de l'Eau de Paris* (SAGEP) (Anonymous Society for the Management of Water of Paris), since 1992 entrusted with the responsibility for managing the water supply for the City of Paris.

allocations were allowed more flexibility through community and catchment-based water institutions.

But again, overall confidence in water services is vital, and yet distrust is easier to build up. This is well illustrated by the situation in much of Eastern Europe and in large cities in the Third World. In many of these locations, utilities are not reliable, and water users distrust their utilities: why would they pay gladly for an 'inconstant' service of poor quality water? And yet, the alternative strategies adopted by various user groups to compensate for the unreliability (cisterns, private wells, water vendors) exacerbate the uncertainty for the municipal service. They also tend to aggravate the inequity between the rich and the poor, since the latter will pay more for a little water from vendors than the rich for their luxurious consumption. Zerah (1997) illustrated this with the case of New Delhi. In such cases, trying to apply the economic recipes of developed countries may well prove catastrophic. Maybe it will prove impossible, after all, to upgrade utilities of the South to the standards of European cities; maybe cities need different technologies to provide cheaper services, along with imposing a moral code on water vendors.[21]

Looking at it carefully, one could trace a continuum between the kind of poor public service and private alternatives available in large cities of developing countries, and what one can find in the Greek Islands. Now, if confidence in public water supply in developed countries continues to deteriorate, and if volumes of water sold decline significantly, developed countries, too, may end up with increasingly irregular water supply services. In that case, what still prevails in large Third World cities would eventually become the rule in developed countries as well: individualistic private solutions increase the social fragmentation of cities and nations.

If this is true, then why are we not looking again to the municipalism of the past, as a solution also for the future? It is suggested here that a way out of the downward spiral of distrust is to involve the municipality, as in the good old days before local welfare and public economy got thrown into the dustbin of history. This type of arrangement may not fully solve the social reverse salient that is threatening public services in developed countries. However, the municipal choice is clearly part of the solution, certainly more so than international financial institutions may think. In particular, while many NGO observers amalgamate the privatisation of the water resource as such with the privatisation of water services — which would result in poor people being starved of freshwater — the real issue is that if local government is weak, there is no institutional mechanism to forge solidarity between social classes through common infrastructure. Yet, as contemporary European history shows, the main objective of having the municipality manage the water supply was to get the rich to pay for good clean water for the poor, for reasons of controlling epidemics. And this had to be done at city level, which was and still is meaningful. 'Good governance' and 'public-private partnerships' must not forget that.

[21] Public distribution of bottled water could be one soultion; public fountains with chip cards is another; delivering bulk water at the neighbourhood level is being experimented with in Latin America, as is also "condominial" sewer systems which reduce the total length of public sewers.

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