

# Privatisation of German urban water infrastructure in the 19<sup>th</sup> and 21<sup>st</sup> centuries

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## Abstract

*At present, public water supply and waste-water disposal services both find themselves in a transitional phase. Most prominent features of this transition are observed in particular with respect to their organization and to their modes of ownership; but it is evident, that the transition comprises all elements of the water infrastructure.*

*This paper will follow the analysis of infrastructure developed by netWorks, a project partnership, according to which the primary level of such systems include not only technical-material infrastructural elements (supply systems and waste disposal systems, network hubs, production and regulation facilities, etc.) but the supply and disposal firms themselves as well (all those who provide the necessary goods and services aimed at institutional and organizational solutions to infrastructural problems).*

*A secondary level of infrastructural systems comprises:*

- *physical environmental conditions and range of available resources*
- *cultural values and societal institutions for dealing with and exploiting re-sources*
- *political, administrative, legal and economic institutions (cf. Networks 2002).*

*The aim of this paper is to gain a better understanding of the current discussion about the privatization of water infrastructure goods and services by looking at its historical development. In the following, therefore, the historical development of the organizational forms, the modes of ownership and the relations of responsibility pertaining to water infrastructure systems in German towns and cities will be discussed. The last great transition of water infrastructure happened in the 19<sup>th</sup> (and early 20<sup>th</sup>) century. A look at this last great transitional phase will help to develop a perspective on the current transitional phase.*

## Historiographical Legitimation – who dark and dirty have the Middle Ages been?

In the middle of the 19<sup>th</sup> century engineers as well as municipal policy makers and hygienists all looked to the water infrastructure systems developed by the Romans. In order to provide the industrialized cities with adequate supplies of good water they looked to Roman technology for legitimation of their own projects. In doing so, they justified not only the building of central water supply utilities but also the directing of urine and feces into communal waste water and then its quick removal from the communities into rivers by means of an effective sewer system.

In the colonial cities of the Roman provinces of Germany the bricked viaducts that were the basis of the water supply systems and the urban supply system as well as systematic sewers were matters of public concern and action. Similar to the Roman capital in the colonial cities the water infrastructure was matter of public concern and action. With a great deal of Roman engineering skill and effort sufficient water was brought down from the surrounding mountain regions to cities such as Cologne, Mainz or Trier, where it was distributed, in a 50 kilo-meters distance to their springs (cf. Grewe 1986). These systems fell into disrepair after the end of the Roman occupation. The sewage canals - with a few exceptions - were also no longer extended and, in the course of the passing centuries, only to some extent properly maintained (Vereinigung für Abwasser, Abfall und Gewässerschutz 1999). Communal organization, which had been embedded in the centralized, dirigistic Roman empire, was weakened. Infrastructures with regional extension, such as the Roman long-distance water supply systems, could no longer be protected from acts of violence or sabotage by a standing army. As a result, the technical level of water supply and disposal systems dropped - in comparison to the Roman colonial cities - to a low point. At the same time, the responsibility for water supply and disposal was divided in an entirely new way between local authorities and self-suppliers (under private or collective forms of ownership) than that found during the Roman era, or later during the industrial era. Private initiative was the rule; while local authorities had mainly a regulatory function (Büschefeld 2000, Kluge, Schramm 1988). From the Middle Ages on into the 19<sup>th</sup> century residents of towns and cities provided for their own water supply, mainly relying on wells within their city boundaries. The wells were situated mostly in public squares or public streets, but some were found in backyards and even, though rarely, in-side houses (mostly owned by the very rich; cf. Eiden 1996, Kluge, Schramm 1988, Krämer 1999). Drinking water was extracted from the wells by buckets, which were then carried to the residences by the women or the children.<sup>1</sup>

Local ordinances regulated the use of the wells and distinguished sharply between drinking water wells and those for animals or other use patterns. At the behest of local authorities well owners - with the exception of house wells - formed cooperatives in order to do maintenance on “their” wells at regular intervals (cf. Eiden 1996, Kluge, Schramm 1988). These well-cooperatives or “Brunnengemeinschaften” (well-communities) generally served their purpose, not the least because they were an instrument of mutual social control. To be sure, local authorities complained sometimes that the “well renovations,” during which the water catchment was cleaned, turned into neighbourhood parties with heavy drinking. But for the most part the decentralized water supply system, despite the occasional complaints to be found in old local registries, functioned.<sup>2</sup>

As a result, only a few additions were made to this water provision system from the early modern times on: Following the model of the cloisters, large manor houses (e.g., the Munich Hofburg), hospitals and, occasionally, water intensive trades drew their water externally from springs or rivers (cf. Bärthel 1997, Büschefeld 2000, Krämer 1999, Münch 1993). This pipe water was then distributed to those entitled to it by means of a small-scale water net which was normally cooperatively organized. In some cases such a pipe system was owned and operated by a private company; its owners had an “eternal” right of being supplied with a defined amount of water. But such systems were the exception, not only because of the need for expensive repairs, which if not executed resulted in extreme levels of water loss, and which could lead eventually to an abandonment of the water supply system, but also because they were extremely vulnerable in the case of a military siege of the city.

After the Napoleonic wars siege and starvation were no longer successful as military tactics, so, as cities expanded, they no longer “upgraded” fortifications with their moats, but gave it up. With the loss of the

fortified moats the water table within the cities would often sink, making it more difficult to get water from a neighbourhood well. Wells had to be dug deeper or abandoned.

The inner-city well-water economies had reached their quantitative limits in any case in the 19<sup>th</sup> century due to the growth of the cities. Regarding the well water quality the situation was no longer sustainable as well, because, among other reasons, some abandoned wells had been turned into cesspools for garbage, urine and feces. Unregulated disposal led to an increase of feces-related bacteria in inner-city ground water (cf. Büschenfeld 2000, Eiden 1996, Kluge, Schramm 1988, Münch 1993, Schramm 1997a).

At the same time the culturally determined threshold of tolerance of filth had been growing since 18<sup>th</sup> century, so that complaints about feces filled streets became more and more common. The odours from outhouses, for example, also insulted the increasingly sensitive noses of the bourgeoisie that now was in power (Büschenfeld 2000, Corbin 1982, Schramm 1997a).

## Private or Public Sponsorship of Water Infrastructure in the 19<sup>th</sup> Century

With the reform of municipal government (e.g., in Prussia in 1831) municipal government's area of responsibility was widened: In addition to preserving order municipalities were now "required to perform all tasks necessary for the satisfaction of a municipality's needs" (following (Most 1909). Cities could attract industrial enterprises, entrepreneurs and workers in a better way by providing them a dependable water supply system. To this end, water quality would have to meet certain minimum standards.<sup>3</sup>

However, it was only during the run of the 19<sup>th</sup> century that the provision and distribution of sufficient water for urban populations in historic city centres, and in the more recently developed neighbourhoods, as well as for industrial enterprises, was accepted as the responsibility of municipal policy makers (cf. Eiden 1996, Krabbe 1980, Münch 1993). Beginning in the middle of the 19<sup>th</sup> century the self-supplying well economies of the "old cities" were regarded as no longer satisfactory. Therefore exploitation of water resources situated outside the municipalities' city limits, and their distribution via water main systems, became increasingly a goal of municipal policy making.

In 1843 the first central municipal water supply and sewage system on the continent was built in Hamburg, following a fire which had destroyed the greater part of the city. Sewers were now to drain urine and feces as well, which would be transported along with flush water from the new imported water closets. This "English system" - a bundling of technologies as the central water supply system, WCs, and sewers - claimed to deal with the existing deficiencies of the "medieval" water supply systems, as well as taking care of the problems of disposing of excrementa and providing for communal hygiene. The proponents of this bundled technology emphasized odourless and sanitary removal (cf. Melosi 2000, Münch 1993, Reulecke 1985, Schott, Skroblied 1987, Schramm 1997b, Tarr, Dupuy 1988).

This 19<sup>th</sup> century water infrastructure technology, however, did not become widely accepted immediately. The investment cost for the municipalities were too high. Only in rich Hamburg was the complete package of technologies installed with little resistance of the citizenship.

The financial problems were reinforced by uncertainties in the assessment of the developing technological paths: The hopes that were initially placed in the "English system" as a means of recycling the nutrients of sewage failed in most cases due to technological or financial problems (cf. Schramm 1997b). The opponents of the WCs argued that its use led to a contamination of the rivers as well as a wasting of the

nutrients contained in the sewage. Technological alternatives (vacuum sewage systems, waste barrel removal, dual water systems) were proposed. Subsequently, from the 1860's on, hygienists, sanitary engineers and municipal policy makers were divided for over a decade on the question of which infrastructure was the best (Kluge, Schramm 1988, Schramm 1997b, Simson 1983, van Zoon 1986).

But it was not only a matter of solving the technological problems of the water infrastructure and its bundling with other technologies; there were also organizational problems to be dealt with. Above all, however, was the problem of whether municipalities and their citizens alone could raise the large sums needed for the high levels of investment required. Despite their expanded range of responsibilities as a result of the reforms of the early 19<sup>th</sup> century, the municipalities continued at first to follow a conservative fiscal policy of concentrating on debt retirement (Büschendorf 2000, Krabbe 1980). One of the key questions, therefore, became whether water supply and waste disposal systems should, in a manner similar to street lighting or gas lines, be provided by public authorities or instead by private stock companies.

In contrast to Hamburg, the first water companies founded in Prussia were private capital companies which expected sufficient profits. Water utilities in Berlin (1852/56), Altona near Hamburg (1854) and Magdeburg (1858) were financed and run by private companies, which were granted a local utilities monopoly. In doing so, the municipalities and companies were following the example of large cities in England and Italy (cf. Krabbe 1980, Reulecke 1985).

In Germany a debate on the public vs. private sponsorship of water supply utilities was carried on in the 19<sup>th</sup> century, above all in Berlin. In 1852, the Prussian capital refused to build and operate a water supply infrastructure. At the behest of the State government and the king the municipal supervisory agency by the Prussian district or "police president", (and not Berlin's municipal authorities) signed a supply contract with a private consortium (cf. Bärthel 1997, Bienert 1981, Kluge, Schramm 1988).<sup>4</sup> Subsequently, the "Berlin Waterworks Company" was founded by the private contractors coming from England. This "Berlin Waterworks Company" laid water mains, built a waterworks on the Spree river and began to operate its water infrastructure system in 1856. But the expectations of the company were disappointed. One year after starting operations they were only 314 houses connected up, and it was only by the middle of 1864, that the company was servicing 3633 houses.

Due to the missing demand profits were slow to come at first. To get higher numbers of connections the "Berlin Waterworks Company" started a marketing campaign. In advertising brochures the landlords and private house-owners were tried to convince of the agreeableness and comfort of the modern water supply. Even gender-related arguments were used (cf. Frank 2004).

The situation turned in the second half of the 1860's. After having made only losses in the first years, by 1868 the "Berlin Waterworks Company" showed a return of 9%, with this rising, by 1873, to 12.5 %. Still, it seemed evident that the private company was not able to provide the whole city with a supply infrastructure. Moreover, the residents of higher lying neighbourhoods such as the relatively "well-to-do" Prenzlauer Berg could not be supplied, due to the low pressure level (cf. Tepasse 2004). Even the water mains in the firstly connected neighbourhoods, which had been wrongly scaled during the start-up phase due to low demand in the first decade, proved to have a very narrow diameter. Because of that it was assessed by the municipal fire brigade, that there would not be enough water available to fight fires (cf. Bärthel 1997, Bienert 1981).

The insufficient dimensioned water supply network led to an unacceptable situation for the politicians in the Berlin municipal council. The contract with the "Berlin Waterworks Company" was miserably

constructed because it did not allow the State to achieve subsequent improvement and to solve the problems without further costs (Mohajeri 2004). The private water utility refused to scale the water infrastructure system in a manner adequate for the expanding capital. Despite additional investment of money, technical improvements - laying the mains, which had frozen during several winters, deeper and expanding the water works - were undertaken only to a modest extent, which did not seem to satisfy the municipality.

From 1868 on, therefore, Berlin's policy makers considered taking over the utility themselves. The Prussian State and its "police president", however, did not want to end the contract with the private utility prematurely to avoid contract penalties. Therefore they argued that the "Berlin Waterworks Company" had fulfilled its contractual obligations. At that time it was also questionable whether the city was in a position to raise the capital necessary for buying and improving the water infrastructure.<sup>5</sup> Therefore the Prussian "police president" suggested dividing Berlin into two monopoly areas, one for the current private utility and a second for a water infrastructure system run by the city's municipal council (cf. Bärthel 1997).

This was not acceptable to the Berlin municipality. As the conflict continued the city pointed out the, in its opinion, close connection between expansion of the water supply system and a not yet created sewer system. The private utility was not acting in accordance with the requirements of the municipal policy makers (cf. Bärthel 1997, Bienert 1981). In fact, the "Berlin Waterworks Company" did not only earn money by selling drinking water but also from the sale of plumbing fixtures, which were offered through catalogues. This led to the spread of water closets in the well-off neighbourhoods, without having the needed sewage systems at hand. In a manner similar to other metropolises (such as e.g. New York, cf. Melosi 2000, Gandy 2003) water closets were installed in Berlin without any regard for subsequent problems. The contents of the WCs were flushed at first into old private pits, but these were not able to handle the large additional amount of flush water, which, as a result, then overflowed into the gutters. There the filth piled up. But the private "Berlin Waterworks Company" was also unable to provide the water needed to properly clean the gutters (cf. Bienert 1981, Reulecke 1985). The "medieval conditions" that were thought to have been left behind (cf. Büschenfeld 2000, Schramm 1997) thus returned, as far as filth and stench were concerned, in a new form.

The supply contract that Prussia had signed with the private company had - in the eyes of the Berlin municipal authorities - "led to a grave danger to public health and well-being." Only 250,000 Berliners were supplied with running water, while 450,000 had to "do without this beneficence." (following Bärthel 1997). As the conflict continued, the city demanded, in 1870, that the Prussian Economics Minister cancel the contract as part of a compensation mediation. After a thorough examination of the case the Minister transferred the State's right of appropriation to the municipality. At the end of 1873 the City of Berlin was able to buy the company, which was badly in need of modernization, for twice as much as the sum invested by the consortium. The municipal council took the money from a fund that had been originally set up to finance the sewage system (cf. Bärthel 1997).

By the end of the 1860s the majority of larger cities had agreed to give up their old well-water supply systems. At first there was in general a willingness to transfer the responsibility for water supply to private companies. But given the experience in Berlin - in particular, the extremely slow amortization due to the low demand for connections at the beginning - municipalities (with some exceptions such as Bonn or

Mülheim, on the Rhine's right bank near Cologne, cf. Froitzheim, Beckmann 1922, Paul 1900) could not find any private companies willing and able to provide professionally built and run water utilities.

This becomes clear when we look at a few cities in the Ruhr area. Dortmund, and its surrounding industrial communities, had to do without an efficient drinking water supply system that could replace its well-water supply system for a long time (cf. Krabbe 1980, Mühlnickel 1995). An attempt to develop new re-sources and distribute water by means of a tape water network by founding a stock company failed due to a lack of interest on the part of investors, who could expect a better return on their investment from, for example, a gas works. Private investors were prepared, on the other hand, to lend money, at exorbitant rates, and to build a water infrastructure system which the Dortmund municipality would have to operate. Industrial customers, who were to be a part of this financing consortium, wanted, at the same time, much lower rates for them-selves as those to be charged to private customers. These conditions under which the Dortmund City Council finally decided to build and run a municipal water utility themselves, giving up any hope of a private solution (cf. Krabbe 1985).

In Ruhr district city Mülheim there were not even investors to be found to finance the building of a facility. In 1873 the city called for bids on a contract for building and running a water supply system under two possible models: one would have a government utility run the system; under the other a private utility would do so, but the city would retain a right of devolution (which meant the utility would belong to a private company who would also run it, but the city could, after an agreed to period of notice, take over the utility itself). It was clear from this that the city fathers had decided on a private option; they only wanted to buy those shares that no other investors wanted. However, the general contractor who was commissioned in 1874 to start up the project could not find any investors at all for a Mülheim waterworks; as a result, the city had to build the facilities and run the utility itself (cf. Eiden 1996).

In taking over responsibility for the water supply system municipalities faced growing budgets. In part, the municipal policy makers - such as in Remscheid - hoped to cover the investment costs with cross-subsidization, in particular by using surpluses from the municipal gasworks. This led, in the case of Remscheid, to building a facility that was too small (cf. Krabbe 1985).

But for a long time such cross-subsidization between different municipal utilities - as practiced also in Münster - remained the exception. Gasworks owned and operated by a municipality were, into the 1870s, rare; while licensing and individual leasing arrangements with private companies were still more common (cf. Eiden 1996, Krabbe 1980, Reulecke 1985). Where, as in Bielefeld, for example, the municipality was active in different utilities (water, gas), these were normally run separately. Cross-subsidization was not possible at first either. As again the example of Bielefeld shows, large sums of money were needed for constructing water supply systems, but it was not possible to draw on profits from the gas utility because these had to be reinvested there, since municipal gasworks had to be expanded, or rebuilt elsewhere, after being initially constructed on too small a scale (cf. Büschefeld 2000).

As a rule, municipal financing of infrastructure projects required borrowing on the part of the municipalities (cf. Krabbe 1980). The cities were only in some cases able to get industrial customers to provide advances in the form of loans (cf. Bienert 1981). Municipal borrowing, mostly in the form of municipal bonds, was monitored by the Municipal Supervisory Agency. In this way, the State set the framework for municipal borrowing. The projects so financed (for example, in Prussia) had to be in response to extraordinary circumstances; had to serve the public good, both currently and in terms of

future generations; and had to pay for themselves in the long run, even eventually making a profit (cf. Büschenfeld 2000, Krabbe 1980).

In addition, with the revision of local codes, fees for those using municipal utilities came to replace taxes as the mode of financing (cf. Krabbe 1980, Münch 1993). Starting in the second half of the 1870s, then, the States comprising the German Empire enabled the municipalities to finance and run water supply systems themselves by means of these two new modes of financing, municipal bonds and utility fees.

To some extent the case of the water supply and sewage utilities showed that private companies could not provide access to comprehensive access to water supply and disposal, as was the case also with gas supply systems.<sup>6</sup> Private water companies were also accused of not being very concerned about the quality of the water (cf. Bleidieck 2001, Büschenfeld 2000, Kluge, Schramm 1988, Paul 1990).

Most municipalities who had contracted out their water supply to private firms took the established infrastructure system over themselves at the earliest moment possible under their contracts. Municipalization was in some cases justified with reference to overcharging, obsolete facilities and the failure to provide linkups to whole neighbourhoods. In addition to fostering hygiene and promoting industry the financial advantages for municipal budgets were also emphasized, something which the city councillors and municipal administrators, in light of the increasingly expensive municipal services being offered, did not want to do without (cf. Bienert 1981, Eiden 1996, Krabbe 1980, Münch 1993).

By the first decade of the 20th century 94% of water utilities were municipal (cf. Grahn 1897/1900, Krabbe 1980). The remaining private utilities were mostly non-local utilities providing water to, in some cases, whole regions. For example, in the Ruhr area, with a ground water economy disturbed by coal mining, the “Waterworks for the Northern Part of the Westphalian Coal Basin,” founded in 1887, was active. This industrial based provider had signed mid-term and long-term supply contracts with 124 rural communities and with numerous industrial firms in the Ruhr area.<sup>7</sup> And the private providers Thyssen and RWE joined forces in 1912 with the Mülheim municipal waterworks and the Oberhausen Waterworks Inc to form the Rhine-Westphalia Water Company, an early example of public-private partnership (cf. Eiden 1996, Krabbe 1980).

One can see a move from municipal self-provision to regional provision in other mining areas as well, for example in the Saarland, where already before World War I almost all mining communities had signed contracts with the (State owned) coal mines, in order to assure a supply of water despite the drying up of wells and ground water mains (cf. Krämer 1999).

## Area-wide Infrastructure Services as Part of Municipal Provision of Essential Services

Already in 1886 Düsseldorf's Mayor Hammer spoke out for the municipal provision of water supply, arguing that for the sake of the poorer classes alone “the satisfaction of such a basic need” should not be left to private firms; rather, the “satisfaction of (such) personal and economic needs” belongs to the “natural competency” of the municipality (following (17)). This kind of municipally based social policy became more or less the standard for German municipal policy making over the course of the following decade, as the old social welfare system, divided between State and charities, gave way to a professional, municipal based public social welfare administration (cf. Reulecke 1985).

Parallel to the establishment of a national policy oriented toward economic intervention - as a result of the so-called “Gründerkrise,” the economic stagnation following the boom during the founding of the Empire - one can see, at the municipal level, a transition to the principle of “Daseinsvorsorge” (provision of essential public services), as formulated later during the time of Nazi Germany by Ernst Forsthoff, an expert in constitutional law. The liberal doctrine according to which public administration was to be used to do away with brakes on economic activity was replaced by a principle of providing and caring for social groups (and individuals as well) (cf. Krabbe 1980).

The trend from an “honorary” municipal administration, based on voluntary, part-time service, to a professional one was accelerated by the municipal operation of water infrastructure. Early on, those working for water supply and sewage were among, along with the mayor, the municipal treasurer and the police forces, the few full-time municipal officials (cf. Krabbe 1980, Münch 1993).<sup>8</sup>

The transfer of responsibility for water infrastructure in the small towns and rural communities, where such a professional administration could not at first be established, was not achieved until after 1900, with advisory support from the States (cf. Krämer 1999, Schramm 1991).

The change in the government’s conception of its role from *laissez-faire* to provision of essential public services can also be seen, in the case of Prussia, in the changes in its tax code. In the first few decades of their existence, waterworks, when not directly linked to sewage facilities, had been viewed as commercial enterprises subject to municipal taxes, with the sale of water seen as a profit making business. Only starting in 1882 were the water utilities freed from tax assessment, when their main function was seen as providing hygienically unobjectionable drinking water and, as a result, their role as a public utility gained priority (cf. Krabbe 1980, Reulecke 1985).<sup>9</sup> Legislators at both the State and Empire level required the municipalities to assume the role of guarantor, that is, to commit themselves to assuring the provision of drinking water (and water for industrial use), and to the maintenance of the quality of drinking water. Inside a few decades, then, what at first had been a voluntary assumption of responsibility on the part of the municipalities became the duty of a guarantor.

Sewage disposal, on the other hand, was seen as an essential task of the municipalities. Already before 1882 sewage disposal facilities were regarded as “*polizeiliche Anstalten*” (“public safety institutions”) and freed from tax assessment. Some municipalities contracted private companies to drain the feces pits and dispose of the contents, for which they could charge a fee (cf. Krabbe 1980). In contrast, however, to gas utilities or, at the beginning at least, to water supply utilities, no private company in Germany was prepared during the 19<sup>th</sup> century to bear the costs of building sewer systems (cf. Schott, Skroblied 1987). Nor were associations willing at first to run sewage treatment facilities, except in a few cases. Apart from the special case of the coal mining regions (here the Emscher Association is paradigmatic; cf. Bleidieck 2001), it is only since the 1950s that associations have been active in sewage management, running non-local sewage treatment facilities. Despite their organization as private enterprises, the municipalities that own them have had, as a rule, a say in their operation (cf. Krabbe 1980, Kluge, Schramm 1988, Vereinigung für Abwasser, Abfall und Gewässerschutz, Ges. zur Förderung der Abwassertechnik 1999).

## Prospects: Beginning of a New Debate

In the German debate on the modernisation and liberalisation of municipal water supply, the historical experiences with a private company financed and operated water supply infrastructure are not present at

all. Therefore the new debate on privatisation of the water infrastructure is led without historical consciousness.

Modern sewers as well as water supply networks were part of the “hidden city” in the underground. This water infrastructure system built since the 19<sup>th</sup> century has been very expensive due to underground engineering and, as a rule, could not have been financed privately. As a result of the public investment on the part of Germany’s municipalities and rural communities there is a high level of access to public water supply and sewage infrastructure. According to the Federal Bureau of Statistics access to water supply systems lay, in 1998, at almost 99%. 93% of households in the Federal Republic of Germany are connected to public sewer systems. The fee system makes possible a high level of technology, and therefore the provision of high quality, and the maintenance of environmental standards, while sometimes resulting in overly expensive solutions (cf. Lux 2002).

Over the last 130 years it has been possible - despite considerable financial problems at the beginning due to weak acceptance on the part of potential customers - to provide the population with water services nationwide.

Today only new housing areas require capital-intensive extensions of the water infrastructure systems. The municipalities are experiencing new financial crises, while modernization of existing systems is overdue. For these reasons the question of whether to privatize water supply and sewage infrastructures may be arisen anew.

In the actual debate on privatisation of water infrastructure it is often over-looked that investment in the modernization of existing technical infrastructure facilities is necessary. The problem of maintaining the net-work is bound up with the question of its future dimensions.<sup>10</sup> To that extent, there will be a restructuring and perhaps even a downsizing of water supply and sewage infrastructures. Depending on the level of investment, and the solution chosen, these changes in infrastructure may also permit a sustainable use of water and other resources (cf. Schramm 1997). That is one reason why the current debate over the private takeover of water utilities will of necessity be linked to the question of sustainable development and protection of the environment.

With the public discussion of government responsibility or privatization one can discern a massive erosion of classical principles of political economy, without there being a corresponding development of new and generally recognized principles of government intervention at the national, state or municipal level. The recognition of the responsibility on the part of municipal policy makers to provide essential services, as this was developed between 1866 and 1930, has been called into question by Europe-wide legislative initiatives as well as by the crisis-ridden municipal financial situation.

Financing by means of a “consequent fiscal policy” (Münch 1993), as practiced since the Weimar Republic, has been replaced by more adequate forms of cost accounting, combined with target agreements; on this there is a general consensus. In addition, the vertical concentration of different branches of infrastructure provision is also being proposed as a means of rationalization (cf. Kluge, Scheele 2003, Lux 2002, WRc & Ecologic 2002).

Given these challenges, many municipalities will have to adopt modified, and even new, forms of organization, operation and ownership of the water infrastructure. But given the uncertainties mentioned above, this will no doubt result in provisionary and temporary solutions.<sup>11</sup>

However, despite all the changes in basic principles of public provision of essential service, in forms of organization and in ownership, the principle of the responsibility of municipalities for water infrastructure, established in the last third of the 19<sup>th</sup> century, remains unchanged and will continue to function as the relevant framework. It will remain the legal responsibility of the municipalities, also in the future, to guarantee the provision of water (for example, if a private utility goes bankrupt). Furthermore, municipalities are responsible, under the “Wasserhaushaltsgesetz” (Water Resources Act), for proper sewage disposal. Even after a complete sell-off of waterworks, a municipality would still need certain policy making and administrative competencies with respect to water infrastructure. Securing these competencies would create the preconditions for having a say in a more sustainable use of water (cf. Kluge, Scheele 2003).

## Notes

- <sup>1</sup> As a result, domestic water was in short supply in comparison to the Roman era, and was sometimes reused several times. The limited amount of waste water that accumulated could be disposed of without regulation by simply dumping it into ditches or the streets themselves.
- <sup>2</sup> Those complaints have been overrated by some historians of technology following a story-line given by the Industrial water supplier Ernst Grahn (1899, 1902) and hygienists as Max Pettenkofer (cf. Kluge, Schramm 1988).
- <sup>3</sup> Even in the midst of 19<sup>th</sup> century when it was not yet known that certain illnesses and epidemics (cholera, typhus) were spread by water and not by the soil as Pettenkofer believed in his Miasma theory.
- <sup>4</sup> One of the driving forces was the risk that the traditional well economy was not sufficient to fight fires in the expanding capital.
- <sup>5</sup> The financial situation for Prussian municipalities changed after the 1870/1871 war when France had to pay high reparations to its German opponents.
- <sup>6</sup> Incidentally, one can observe a profit orientation on the part of some cities running water utilities in respect to which neighbourhoods first received water mains (cf. Reulecke 1985). The so-called “Manchester phenomenon,” which expressed itself in chaotic urban expansion and equally chaotic utilities provision, was subject to increasing criticism due to the so-called “Gruenderkrise,” the economic stagnation following the boom during the founding of the new Empire. Most municipalities were, as a result of this crisis, now prepared to intervene in the market in matters concerning city planning, housing construction and founding of utilities.
- <sup>7</sup> This company provided also towns and communities in other regions, such as the Eastern part of Frisia; cf. Grahn 1999/1902. The “Waterworks for the Northern Part of the Westphalian Coal Basin” would later become the Gelsenwasser AG, owned by the VEBA AG and serving a public economic advantage. In 2003 this company has been bought by two municipal owned water utilities of the Ruhr region.
- <sup>8</sup> The tasks of providing for water supply and for sewage disposal were, so long as there were no separate government agencies established for these tasks, carried out by municipal building and safety offices. Only in exceptional cases, such as in Bielefeld, was a separate office set up, which was responsible for running the street car system and the energy and water utilities (cf. Büschenfeld 2000). Only after the German Municipal Code of 1935 clearly distinguished between water supply systems as “municipal

enterprises” and the sewage disposal systems as “public facilities” did municipal offices, in an increasing number of cases, lose control over the water supply systems. Sewage disposal systems, on the other hand, continued to remain under their control.

- <sup>9</sup> The recognition of the public nature of the utilities had, however, “the paradoxical effect that one could now really make profits with waterworks” (Eiden 1996), so that, in the Ruhr area for example, the existing private and municipal companies expanded their service areas.
- <sup>10</sup> Migration from economically weak regions leads to, e.g., less demand for water. The drop in the birth rate also can have a similar effect. Human-caused climatic change can lead to an increase in extreme meteorological events, so that, depending on local conditions, it may make sense to disconnect rain water run-off systems from sewer systems.
- <sup>11</sup> Needs for a further transformation of the technical-material part of the infrastructure might lead to new financing problems similar to those in the 19<sup>th</sup> century especially for private utilities.

## References

- Bärthel, H. 1997. *Wasser für Berlin. Die Geschichte der Wasserversorgung*. Berlin: Verlag für Bauwesen 1997.
- Bienert, J. 1981. *Wasserhaushalt in der Industrialisierung. Die Entstehung und Entwicklung des industriegemäßen Wasserhaushalts im Berliner Raum*. Doctoral thesis TU Berlin.
- Bleidieck, D. 2001. *Preußisches Wasserrecht versus Industrialisierung: Steuerung des Modernisierungsprozesses oder Rechtsbeugung im Interesse der Wirtschaft?* In: Goch, S. & Heidemann, L. (eds.), *100 Jahre Bismarck. Ein Stadtteil “mit besonderem Erneuerungsbedarf”*. Beiträge zur Geschichte und Gegenwart eines Gelsenkirchener Stadtteils. Essen : Klartext, 135-148.
- Büschefeld, J. (ed.) 2000. *Netz/Werk/Stadt: Aufbruch in ein neues Zeitalter*. Bielefeld: Verlag für Regionalgeschichte.
- Corbin, A. 1982. *Le miasme et la jonquille. L’odorat et l’imaginaire social 18-19e siècles*. Paris: Flammarion.
- Eiden, C. 1996. *Von der Brunnenversorgung zur Wasserindustrie. Die Wasserversorgung der Stadt Mülheim an der Ruhr 1870-1930*. Mülheim (Ruhr). *Zeitschrift des Geschichtsvereins Mülheim a.d.Ruhr* 68:150-211.
- Frank, S. 2004. *Schmutziges Wasser und schmutzige Frauen. Geschlechtersymboliken in der Stadtentwicklung des 19. Jahrhunderts*. Lecture on occasion of the the workshop “Water and the Modern City” at the Berlin Humboldt University, June, 5, 2004.
- Froitzheim, E. & Beckmann, F. 1922. *Denkschrift zum fünfzigjährigen Bestehen der Rheinischen Wasserwerksgesellschaft*. Köln: Rheinische Wasserwerksgesellschaft.
- Gandy, M. 2003. *Concrete and Clay. Reworking Nature in New York City*. Cambridge, MA: MIT Press.
- Garver, T.H. 1998. *Serving Places*. In: St. Greenberg (ed.), *Invisible New York: The Hidden Infrastructures of the City*. Baltimore: John Hopkins University Press.
- Grahn, E. 1899/1902. *Die städtische Wasserversorgung im Deutschen Reich und in einigen Nachbargebieten*. München, Leipzig.

- Grewe, K. 1986. Atlas der römischen Wasserleitungen nach Köln. Köln, Bonn: Rheinland-Verlag Habelt (= Rheinische Ausgrabungen 26).
- Kluge, T. & Scheele, U. 2003. Transformationsprozesse in netzgebundenen Infrastruktursektoren. Neue Problemlagen und Regulationserfordernisse. netWORKS-Papers 1.
- Kluge, T. & Schramm, E. 1988. Wassernöte. Zur Geschichte des Trinkwassers. 2nd ed. Köln: Volksblatt-Verlag.
- Krabbe, W.R. 1980. Kommunalpolitik und Industrialisierung. Die Entfaltung städtischer Leistungsverwaltung. Dortmund: Kohlhammer-Verlag.
- Krämer, H.H. 1999. Vom Dorfbrunnen zum Wasserwerk. Geschichte der Trinkwasserversorgung an der Saar. Blieskastel: Gollenstein.
- Lux, A. 2002. Wasser – ein Handelsgut? Forum Wissenschaft 19 (2002) Heft 3: S. 57-61.
- Melosi, M. 2000. The Sanitary City. Urban Infrastructure in America from Colonial Times to the Present. Baltimore: John Hopkins University Press.
- Mohajeri, S. 2004. Communication during the workshop “Water and the Modern City” at the Berlin Humboldt University, June, 5, 2004.
- Most, O. 1909. Die Gemeindebetriebe der Stadt Düsseldorf. Schriften des Vereins für öffentliche Social-Politik 129 (2).
- Mühlnickel, R. 1995. Der Verlauf des Konflikts zwischen der öffentlichen Wasserversorgung und der Abwasserbeseitigung im Ruhreinzugsgebiet und Harzvorland (1864-1987). Frankfurt am Main, Berlin, Bern: Verlag Peter Lang.
- Münch, P. 1993. Stadthygiene im 19. und 20. Jahrhundert. Die Wasserversorgung, Abwasser- und Abfallbeseitigung unter besonderer Berücksichtigung Münchens. Göttingen: Vandenhoeck & Ruprecht.
- Networks 2002. Sozial-ökologische Regulation netzgebundener Infrastruktursysteme. Proposal for the German Ministry of Research.
- Paul, J. 1990. Abwasserbeseitigung und Trinkwasserversorgung in Mülheim am Rhein zur Zeit der Hochindustrialisierung. Rechtsrheinisches Köln 16, 39-76.
- Reulecke, J. 1985. Geschichte der Urbanisierung in Deutschland. Frankfurt a.M.: Suhrkamp-Verlag.
- Schott, D. & Skroblied, H. 1987. Die ursprüngliche Vernetzung. Die Alte Stadt 14: 72-99.
- Schramm, E. 1991. Kommunalen Umweltschutz in Preußen (1890-1933): Verengung auf Vollzug durch wissenschaftliche Beratung? In: Reulecke, J. & Gräfin zu Castell-Rüdenhausen, A. (Hg.), Stadt und Gesundheit. Zum Wandel von “Volksgesundheit” und kommunaler Gesundheitspolitik im 19. und frühen 20. Jahrhundert. Stuttgart: Enke-Verlag: 77-90.
- Schramm, E. 1997a. Kreislauforientierung statt Durchflußwirtschaft: Nachhaltiger Umgang mit Wasser, Fäkalien und Flüssigabfällen. In: Becker, E. (Hg.), Soziale Ökologie und Sustainable Development. Frankfurt am Main: iko-Verlag, S. 117-142.
- Schramm, E. 1997b. Im Namen des Kreislaufs. Ideengeschichte der Modelle vom ökologischen Kreislauf. Frankfurt am Main: IKO-Verlag.
- Simson, J.v. 1983. Kanalisation und Städtehygiene im 19. Jahrhundert. Düsseldorf : VDI-Verlag.

- Tarr, J.A. & Dupuy, G. (eds.) 1988. *Technology and the Rise of the Networked City in Europe and America*. Philadelphia: Temple University Press.
- Tepasse, H. 2004. Communication during the workshop “Water and the Modern City” at the Berlin Humboldt University, June, 5, 2004.
- Vereinigung für Abwasser, Abfall und Gewässerschutz, Ges. zur Förderung der Abwassertechnik (ed.) 1999. *Geschichte der Abwasserentsorgung : 50 Jahre ATV 1948 – 1998*. Hennef: Abwassertechnische Vereinigung e.V.
- WRc & Ecologic 2002. *Study on the application of the competition rules to the water sector in the European Community, Final Report*. Swindon/ Wiltshire, Water Plc. <http://www.ecologic.de>
- Zon, van, Henk 1986. *Een zeer onfrisse geschiedenis. Studies over niet-industriële vervuiling in Nederland, 1850-1920*. Doctoral thesis, Rijksuniversiteit Groningen.

