

# SHARED HISTORY OF WATER SUPPLY AND SANITATION IN FINLAND AND SWEDEN, 1860–2000

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## Abstract

Sweden and Finland have a long joint history separated in 1809 when Finland became an autonomous Grand Duchy under the Russian Tsar. The water service sector started developing in urban areas during the latter part of the 19<sup>th</sup> century. The similarities and differences between Finland and Sweden in the water and wastewater services evolution are described. In a questionnaire, 28 water experts from Finland and Sweden assessed the most important long-term strategic decisions in the sector in the two countries concerning the overall development.

In Finland, the most important change came with the Water Act of 1962. It allowed for the first time water pollution control of wastewater discharge from industry and municipalities. Polluters were forced to apply for permit for requiring treatment and allowing for discharging their wastewaters. The most important change in Sweden was when the Swedish Environmental Protection Agency was started in 1968. The Swedish EPA was the first national authority in the world to have a direct responsibility for environmental protection in a broad perspective, and not only in nature conservation. Other policy, economic, social, technological, ecological and legal dimensions are also compared and discussed.

*Key words* – water supply, sanitation, services, evolution, history, strategic decisions, Finland, Sweden, comparisons

## 1. Background and objectives

Sweden and Finland have a long joint history starting from the first crusade in the 12<sup>th</sup> century. Now in 2009, exactly 200 years has passed since the official separation of these countries, whereafter Finland became an autonomous Grand Duchy under the Russian Tsar in 1809. Although part of the latter period, particularly in the early 1900s, had severe period of oppression, the Grand Duchy period as a whole made it possible for the country to build up a nation and reach the independence in 1917.

The objective of this joint Finnish-Swedish paper is to analyse and compare the overall development of water supply and sanitation (WSS) in the two countries from

the 1860s until 2000. These are explored through two key research questions. First, is it possible to find any remarkable differences in water and waste services evolution? Second, what are the long-term strategic decisions that are viewed as most important ones concerning the overall development of the sector? While the major part of the paper deals with urban areas, rural WSS is also taken into account.

The paper will first describe the history and birth of modern WSS in the countries. This will be followed by a comparative study on key strategic long-term decisions as considered by sector professionals in both countries. The third part discusses some of the key findings and their possible implications.

## 2. Early history and WSS systems

Already in the medieval times, many monasteries and castles were built, in Sweden and also to its hinterland of Finland, equipped with water supply. The cistercienses of Varnhem, Alvastra and Vreta had developed constant water supply and drainage to downstream creeks. In Finland, Turku (Åbo) castle was founded at the mouth of the Aurajoki River in the 1280s, and it served particularly the administrative and political purposes of the Swedish Crown. Originally the Turku castle was constructed in an open form of a fortified camp and the first water well dates back to this era, too. When the castle was expanded, a kitchen was built around the well and thus its water was continuously used. Until now this water is clear and of good quality and the well is considered to be the oldest one remaining in Finland.

In the early fourteenth century, the fortified camp was transformed into a closed castle, divided into a main castle and a bailey. (Anon, 2004; Gardberg, 1959, 7–8) In the mid-sixteenth century Turku castle was found to be old-fashioned, deteriorated and an inconvenient place to live. Therefore, the castle was renovated into a handsome renaissance-style dwelling in 1556–1563 and extended to its current size. Water pipes made of lead and copper were installed from Kakolanmäki hill to the castle, the effort requiring some 4000 man-hours in 1561–63. Several additional wells were also built to satisfy the increasing need for water. One of them, with timber frame and stone-lined walls can still be seen in the courtyard (Stenroos et al., 1998, 60; Gardberg, 1959, 309–310; Museovirasto, 2005; Cardberg, 1981).

Water supply of towns was scarce in Sweden and Finland until the middle of the 19<sup>th</sup> century. If any, it was mainly organized through common wells or possibly jetties built in the rivers or lakes where water could be fetched. Towns were generally small, often resembling villages, but congestion and unsanitary conditions prevailed, causing the introduction of modern city planning in the latter part of the 19<sup>th</sup> century. This was strongly inspired by the theories and practices of the French and English industrialised cities. The British public health administrator Edwin Chadwick and Paris urban reformer Georges Haussmann showed clearly that an urban environment could be improved with water supply and sewer systems and by creating rural sanctuaries within towns.

In the middle of the 1800s the ideals of liberalism started to spread among the leaders of the societies. A clear distinction developed between the public and private spheres of society. The private sphere was considered to consist of “private social groupings” – individuals, families and local communities. Yet, local level services were largely managed by private entrepreneurs because

there were not actual local governments and legislation making them possible. The state could have an impact on these matters only through legislation, such as the acts enacted in the 1860s and 1870s (Kilander, 1991 cited by Nygård, 2004; Nelson & Rogers, 1994, 27). The local government acts were not enacted before 1862 in Sweden and 1875 in Finland.

Occasionally in Europe but particularly in North America the modern water systems were initially built on the basis of builder-owner or concession models. In most cases, however, municipalities soon took over these water and sewerage systems. For example, in the early 20<sup>th</sup> century, 93 per cent of the systems in German urban centres were municipal, as were all the urban WSS systems in Sweden and Finland (Wuolle, 1912). During the 19<sup>th</sup> century, the previously private systems came under public ownership and public provision because of the inefficiency, costs and corruption connected to them. In the late 19<sup>th</sup> century, the emphasis was on municipalisation. Democratically elected city councils bought existing utilities and transport systems and set up new ones of their own. This resulted in more efficient control, higher employment, and greater benefits to the local people. Councils also gained the right to borrow money to invest in the development of their own systems (Hall, 2003, 7).

In Linköping, a private company was created in 1873 and three years later, the first households could get piped water. Leading politicians of the city, especially the mayor, argued for a concession solution, mainly based on economical arguments. The local government was initially not considered to be able to afford such large investments, yet many of the share-holders of the private company were members of the city council or belonged to other influential groups. In 1907, the company was purchased by the city (Nilsson, 1994).

Nelson & Rogers (1994) point out the background and birth of the First Public Health Law in Sweden that came into force in 1874. Initially it was clearly influenced by the British Public Health Act of 1848. The committee drafting the 1874 Act considered the promotion of preventive health care of utmost importance. Along with the Act, for instance, public health boards became compulsory in each town. The Swedish Act also served as a model for the Health Decree of 1879 in Finland (Nygård, 2004).

Yet, in historical context it is good to remember that it was characteristic of the whole of Europe that the working classes had no representation in municipal government. For example, it was not until 1903 that the first representative of the working class became a member of the Stockholm city council (Hietala, 1987, 55–56). The same happened in Tampere, Finland in 1919.

In principle the working class had council places already in 1917 but those places were unfilled. (Korkki & Niemelä, 1996)

### 3. Overall WSS history in Finland and Sweden

#### 3.1. Diffusion of water and sewerage systems

The first urban or township waterworks in Sweden was founded in Stockholm in 1861, while the first in Finland in Helsinki in 1876 (Table 1). Before Helsinki already 11 Swedish cities had founded their water works. By 1883 Sweden had 17 urban water works, while Finland only two. In Finland some cities founded their sewerage systems a bit before water works or around the same time while in Sweden water works were likely founded somewhat earlier (Drangert et al, 2002). In Finland ground water was relatively more used while Gothenburg introduced artificial recharge as early as 1902. A total of 16 urban water supply and sewerage systems were established by 1917 when Finland gained full independence.

Network of international and national experts and their knowledge was amply utilised, and tailored to Finnish and Swedish conditions. The technical solutions were introduced in Sweden as virtually uniform systems, designed and projected by a handful of skilled water engineers, where father and son Richert were the leading team. In Finland especially the coastal cities used the ex-

pertise of Swedish experts and also those in Germany, while the networks of key national experts was also actively used between the cities. The expertise of the first water works in Helsinki was in common use but the overall development was not certainly so capital-centered as argued by some authors. (Juuti & Katko, 2006, 91)

#### 3.2. Sanitation history

In Finland and Sweden, sanitation problems were solved along with the water question. Water closets were seen as a solution to sanitation at the end of the nineteenth century. The first legally built water closet in Finland was completed in 1883 in the house of the Bank of Finland and Stockholm got its very first water toilet the same year. In Finland a few ‘illegal water closets’ had been constructed even before that date. There was a heated discussion concerning the necessity of water toilets in Tampere and other cities in the late nineteenth century. At the time, a WC was built in most blocks of flats in Helsinki, but still in 1906 there were instances when outhouses were preferred (Katko, 1996, 57–58; Nygård, 2004). The health board of Tampere demanded in 1890 that a WC, built in one of the downtown houses, should be dismantled, since it was illegal. (TKA, THL BI:1, Gustafsson 10.6.1890).

A similar incident occurred in Helsinki a decade earlier, when in 1882 a businessman, F. W. Grönqvist, had water closets put into his house. Two years later he lost a dispute with city officials, when the senate confirmed the decision of the provincial governor, which

Table 1. *Birth of first urban water supply and sewer systems in Finland and Sweden, 1861–1917.* (gw= ground water)

Finland Town	Water works	Water source	Sewer system	Sweden Town	Water works	1. water intake	Sewer system
Helsinki	1876	river	1880	Stockholm	1861	lake	1866–
Viipuri (Vyborg)	1892	gw	1873	Karlskrona	1862	river	
Tampere	1882* 1898	lake	1894	Jönköping	1865	surface water	1886
Oulu	1902	river	1897	Kristianstad	1870	river	
Turku	1903	gw	1896	Göteborg	1871	lake (artificial gw 1902)	1888
Hanko	1909	gw	1906	Lanskrona	1874	gw	
Hämeenlinna	1910	spring	1910	Norrköping	1874	river	1874
Jyväskylä	1910	gw	1911	Linköping	1875	gw	1875
Lahti	1910	spring	1910	Lund	1875	river	1890
Mikkeli	1911	gw	1911	Skövde	1875	gw	
Kuopio	1913	lake	1906	Uppsala	1875	gw	1875
Porvoo	1913	gw	1894	Gävle	1876	river	
Sortavala	1914	lake	1907	Sundsvall	1878	lake	1879
Vaasa	1915	gw	1915	Malmö	1879	river (gw 1901)	1870–
Kotka	1916	river	1890	Borås	1881	surface water	1881
Kokkola	1917	gw	1923	Vänersborg	1882	surface water	
				Härnösand	1883	surface water	

forbade the running of any impurities from closets to the sewer network (Laakkonen, 2001, 48–50). On the whole, water closets became accepted in Finland by 1900 although in several cities they were taken into use gradually and still in 1960s you could find areas in cities with non-water based sewerage.

### 3.3. Early WSS phases in Finland and Sweden

In Finland, fire insurance companies contributed significantly also towards the development of water services. Water was needed for extinguishing fires as well as for domestic use which motivated villages, municipalities, cities and fire insurance companies. At first, Finnish houses were insured, if at all, with the General Fire Insurance Fund in Stockholm. The “semi-official” Finnish Fire Insurance Bureau was established in 1809 with state support. The issue of fire insurance became increasingly topical immediately following the Great Fire of Turku in 1827.

The General Fire Assistance Company of the Grand Duchy of Finland was established in 1832. (Nikula, 1972; Nuoreva, 1980). Later on cities received funding from this company on good terms for establishing water works. The company operated under the Superintendent’s Office with its domicile in Helsinki. It was a government body, thus not owned by cities. In 1858 the company became renamed the General Fire Assurance Company of Finnish Cities.

The Finnish Rural Fire Assurance Company was founded in 1857, while in 1871 the Finnish Cities’ Fire Assurance Company was set up to insure chattels. In 1873 fire services became a municipal responsibility for good. In 1882 the Fennia Fire Insurance Company opened up for business and was the first in Finland to write industrial fire insurance. The above companies supported the acquisition of fire fighting water and equipment in different ways.

The quite advantageous loan from the fire insurance company considering the prevailing interest rates (average about 6 per cent in the second half of the 19th century) played as large a role in financing the establishment of city water works. Especially the taxes from spirits distilleries were of significance. In each locality a company was given the exclusive right to distill spirits against the payment of a liquor tax.

Normally a small amount of capital was raised over time for the establishment of a water works: about 10 per cent of the total required – through taxes and quite substantial donations and willed sums. Loans were also taken from local banks where necessary. A loan from the fire insurance company was nevertheless generally the largest single source of financing, and the interest

charged was clearly lower than with other creditors. House owners were solely responsible for sewerage until sewage works were set up. In exceptional cases, a city could implement some minor works in the core area. No wonder then that house owners eagerly supported the establishment of sewage works. They also bore the financial responsibility for street maintenance which made them support measures to improve the condition of streets such as putting in sewers. Waste disposal was also left to house owners which made them also favour municipal waste collection and disposal (Juuti, 2001).

In Sweden, compared to Finland, the development of water and sanitation services started somewhat earlier. The innovations and ideas were derived from the pioneering European countries, and many Finnish cities also utilised the Swedish experiences.

The main reason for constructing sewers was drainage. A town must be drained to protect the buildings. Stormwater was initially conveyed in gutters together with the small amounts of sanitary sewage and solid waste that were produced. Already in the mid-16th Century King Gustav Wasa demanded that all property owners must keep a barrel containing 200 litres of water close to the street.

Until the mid- and late 19th century, the primary use of water supply in Sweden in urban areas was to combat fires. They had damaged a large number of Swedish towns and cities. Among only some examples could be mentioned Ronneby 1864; Karlstad 1865; Gävle 1869; Söderhamn 1876; Hudiksvall 1878; Karlskrona 1887; Luleå 1887; Umeå 1888; Sundsvall 1888.

In the middle of that century some bad outbreaks of cholera in Stockholm and Gothenburg killed a large number of inhabitants. This prompted the construction of networks of water mains conveying good quality water to the consumers for health reasons. The use of water in the urban areas increased then almost continuously until 1970. From then on, the demand has been constant or has even decreased. (Katko & Stenroos, 2005)

### 3.4. Historical private proposals to build waterworks

In 1866, a proposal for the establishment of Helsinki water works was made, originally at the request of the Senate. Due to the lack of proper tenders private concessions were requested for (Herranen, 2001, 18). The entrepreneur W.A. Åbegg made two separate proposals to implement the approved plan, and a concession with Åbegg was signed in 1871. He was also given a special permit to distribute water against payment. The concession was given for 75 years, but without any action Åbegg sold the concession further to the Neptun Com-

pany from Berlin in the summer of 1872. (Juuti et al., 2006.)

The new company started constructing the water works, but because of the Europe-wide recession, the project could not be completed as agreed upon (Norrmén, 1979, 7; Turpeinen, 1995, 223). The city bought back the concession, the company made a commitment to finish the work (Waselius, 1954, 25; Norrmén, 1979, 8) and the city started managing the system in 1883 (Lillja, 1938; Herranen, 2001, 21–29).

In Tampere, Finland, the industrialist William von Nottbeck (1816–1890) offered to build a water pipe at the request of the municipal authorities in 1865. He made two consecutive proposals, a shorter pipeline and a network covering the whole town, and also submitted his conditions for running the water supply. These conditions, consisting of ten paragraphs, can be summarised as follows: the industrialist would take the money and the town would take all the risks. Although the implementation of the plan might have been a considerable financial risk for the town, revenue from the planned water pipe would have been only a tiny fraction of the enormously rich aristocrat's income. The town decided, however, not to accept his tender and started developing the water works under municipal administration (Katko et al., 2002). After rejecting private proposal, the city assumed responsibility. At first the city had a low-pressure gravity water system constructed in 1882, followed by a high pressure system in 1898.

In Sweden, a similar private operation proposal was made in Sundsvall in 1874. The industrialist J.W. Bergström from Stockholm made an offer to build a water pipe for 250,000 riksdaler (5 million euros). The town, however, approached J.G. Richter from Gothenburg and asked him to submit a plan for both a water pipe and a sewer (Winnfors, 2008). Linköping has been mentioned earlier. There may have been a few other similar arrangements in Swedish municipalities, but the works have for the most part been under municipal administration (Isgård, 1998). Yet, the first urban water system in Sweden had been established by the city in Stockholm as early as 1861.

## 4. Survey on key strategic decisions

### 4.1. Methods

The surveys on key strategic decisions were conducted in two phases in both countries. In Finland the first phase was to identify the key long-term strategic decisions on WSS based on a literature survey. In total 39 strategic episodes or events were identified whereof 10 are administrative, 12 legal, 10 technical, 5 commercial/

entrepreneurial, 1 economical and 1 educational. These results were presented in a national seminar on 100 years of water legislation in Finland, held in Helsinki, Finland 17 Oct, 2002. Added by feedback this was published in Finnish (Katko, 2002).

After the first phase, 13 well-known senior national experts were each asked to rank the decisions and select the ten most important ones. These decisions were also to be ranked according to their importance from 10 to 1. The 13 experts included four historian researchers, five mainly engineering oriented researchers and four other sectoral experts. While some experts were more competent to comment on the earlier development, others were more familiar with the later phases. The original study was published by Katko et al (2006) while its results are summarised in this paper for comparative purposes.

In Sweden, respectively, the key long-term strategic decisions on WSS were first identified by the second and third authors in 2007–08. The Swedish survey was developed independently but inspired by the Finnish. To choose accurate change/event the work was handled through successive elimination. Five different researchers or experts were asked to suggest the most important events or changes that have affected the water sector of Sweden. Together with the authors of this paper, the group managed to identify 42 such changes. From these, a questionnaire was developed which was sent by e-mail to 35 experts, researchers and scholars in Sweden. Out of them 15 replied to the questionnaire, another 10 declined, and 10 did not answer at all. Compared to Finland the focus of the decisions differs to some extent: 9 are technical, 10 are organisational and institutional, 13 are legal, 2 are economical, 2 commercial/entrepreneurial and 6 are educational.

Although the selection of experts in both countries was not necessarily fully balanced, it is still probably the best group of experts readily available for such reviews. The experiences on the Finnish case were naturally utilised in identifying the key decisions and carrying out the actual survey in Sweden. Thus, in addition to being a comparative study it was also cumulative.

### 4.2. Key decisions identified

Table 2 shows the 39 key strategic long-term decisions /episodes that were identified based on the literature survey in the Finnish case. The original format sent to the selected experts at the second phase included also columns explaining the reasons and outcomes that are excluded in this paper. In identifying the decisions a wider framework was kept in mind including policy, economic, social, technological, environmental and legislative (PESTEL) dimensions.



The overall development of Finnish water supply and sewerage services can be divided into the following key periods:

- (i) Early discussions and proposals for private concessions until 1880;
- (ii) Establishment of the first water supply and sewerage systems in the biggest cities, 1880 to 1917, as municipal departments and works;
- (iii) Expansion of the systems and establishment of new ones, 1920 to 1940;

Table 2. *Key long-term strategic decisions on water supply and sanitation in Finland (Katko et al., 2006, shortened form).* ws = water supply; FIWA = Finnish Water and Waste Water Works Association.

Year	Strategic episode/decision
1866	private water supply rejected in Tampere
1871	concession for Helsinki water works
1872	1st rural piped water system
1875	Local Government Act
1876	1st urban water works in Helsinki
1877	water meters into use in Helsinki
1879	Health Degree
1879	Oy Huber Ab, pipelaying company
1882	Helsinki water works bought back by the city
1890	metering based billing only, Helsinki
1890	use of lead pipes forbidden, Helsinki
1892	1st urban ground water system, Vyborg
1900	water closets commonly accepted
1902	Water Rights Act
1906	universal and equal suffrage
1907	Cooperative Act
1910	1st biological wastewater treatment plants
1912	1st contractor (YIT), subs. of Swedish AIB
1917	independent republic
1920	Tampere rejected ground water
1938	1st separate sewers
39–44	WW II
1949	1st consulting companies (2)
1951	1st Governmental Financing Act
1954	start of domestic plastic pipe manufacturing
1956	FIWA's (1993) predecessor established
1958	1st overseas export project
1962	Water Act
1967	1st professor in ws and sanitation
1967	1st wholesale water supply company
1968	regional planning for the whole country
1968	start of development cooperation in WSS
1970	water administration
1974	Wastewater Surcharge Act
1977	Act on Public Water and Sewerage Systems
1982	120-km Päijänne rock tunnel
1995	Local Government Act
1995	Finland joined EU
2000	Environmental Protection Act
2001	Water Services Act

- (iv) Reconstruction followed by major expansion of systems including stronger water pollution control measures, 1950 to 1980;
- (v) Increasing autonomy, inter-municipal cooperation and outsourcing of non-core operations, 1980–2000.

Table 3. *Key long-term strategic decisions on water supply and sanitation in Sweden (shortened form).* wworks = waterworks; ww = wastewater; wss = water supply and sanitation; wwtp = wastewater treatment plant; IAWPRC = International Association on Water Pollution Control and Research; www = water and wastewater.

Year	Strategic episode/decision
1851	Stockholm
1861	1st urban wworks; Stockholm, Karlskrona
1862	municipal reform
1870	Linköping, 34 year concession
1875	1st Public Health Act
1897	Vattenbyggnadsbyrå, VBB
1901	aib company
~1900	buying of Bornsjön/Nordborg area
~1900	water-closets commonly accepted
1901	1st ground water system, Malmö
1901	1st artificial recharge plant
1903	1st professor in water structures, kth
1905	union with Norway ceased
1911	1st biol. ww treatment plant, Skara
1919	general/equal right to vote for parliament
1919	Water Act
1919	Public Health Act
1925	compulsory metering in Stockholm
~1950	1st separate sewers
1930s	1st water federation, Norrvatten
1952	municipal reform
1954	Vattenvårdskommittee/
1957	1st wastewater federation, Käppala
1962	1st professor in WSS, Chalmers
1962	Swedish association of www works (VAV)
1965	start of dev. cooperation within wss
1966	Sydvatten Ab
1967	Creation of Naturvårdsverket, Swedish EPA
1969	1st Environmental Protection Act
1970	Public Water and Wastewater Plant Act
1971	Food Act
1972	Stockholm environment conference
1970s	grant program for wwtp:s
1978	9th IAWPR intern. conference, Stockholm
1985	80-km Bolmen rock tunnel for south
1989	1st municipal water company in a city
1990	Va-forsk r&d programme started
1991	1st Stockholm water symposium
1995	Sweden joint the EU
1998	Local Government Act
2000	Environmental Protection Act
2006	Water Services Act

Table 3, respectively, shows the key identified strategic long-term decisions in Sweden, amounting to 42. When preparing the list of decisions the second author interviewed some ten Swedish experts in August 2007 and discussed the list of the key decisions and major sources. Later the third author developed the list further by correcting and adding a few additional decisions.

The long-term development of WSS services in Sweden can be divided into the following key phases:

- (i) Some early concessions simultaneously with city managed undertakings from 1850–1880;
- (ii) Establishment and expansion of water and sewerage services in 1890–1930 as municipal departments and works;
- (iii) Expansion of systems including water pollution control, 1950 to 1980;
- (iv) Increasing autonomy, inter-municipal cooperation and outsourcing of non-core operations, 1980–2000, with few private contracts. (Katko & Stenroos, 2005, 198)

### 4.3. Ranking key decisions

#### Finland

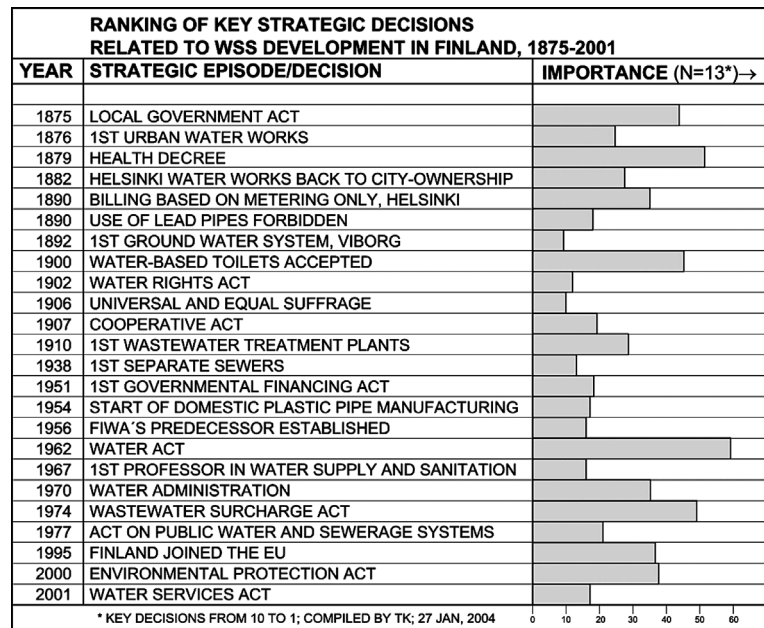
Comments by 13 Finnish water experts in Fig. 1 showed that legislation and the various decrees and acts were considered very important as regards the overall development. The Health Decree of 1879 was to a large extent a copy of the Swedish decree of 1875 (Nygård, 2004).

After the Local Government Act (1875) and decision for municipal ownership and responsibility in Helsinki (1882), some technology-related selections were made, including metering-based billing (1890), ban on lead pipes (1890), and the acceptance of flush toilets (1900). Ground water was used initially, abandoned largely in the 1920s, and reintroduced gradually after WWII together with artificial recharge. In the latter the Swedish knowledge was actively used.

The Water Right Act (1902) had emphasis on economic water use and promoted hydropower construction, particularly. Although it contained some principles against changing and polluting water courses, water pollution control remained voluntary. Yet, a few cities started wastewater treatment as early as the 1910s while the construction of modern wastewater treatment boomed in the 1960s and 1970s. This was due to Water Act that came into force in 1962 and for the first time had the necessary enforcement and discharge permits to make communities and industries starting modern wastewater treatment. Along with that separate sewers were gradually introduced making it technically feasible to treat wastewaters. Wastewater Surcharge Act (1974) more than doubled the water bills.

Important social and political reforms such as municipal reforms and universal suffrage also certainly influenced sector development. Tactically or politically one of the most clever episode in Finland was to establish the Committee for Rationalisation of Households

Figure 1. Key long-term strategic decisions on water supply and sanitation in Finland, 1875–2001 (Katko et al., 2006).



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after WW II. The committee had eight influential women as its members and it largely influenced the first water sector financial act of 1951. Water administration (1970) and the Environmental Protection Act (2000) were also regarded major events. In 1995 Finland and Sweden both joined the European Union.

Private companies offering their goods and services have emerged gradually based on demand (Hukka & Katko, 2003, 120). WSS exporting activities as well as related development cooperation started in the 1960s. Sectoral associations, such as the Finnish Water and Waste Water Works Association, have also developed gradually. The first university chair in water supply and sanitation started in 1967.

In rural areas the Cooperative Act of 1907 made the water cooperatives, first recorded case from 1872, legal. Since those days consumer-managed water cooperatives have been established especially in rural areas though some of them take care of services even up to 10 000 people (Katko, 1992; Pietilä et al., 2009)

### Sweden

The most important change in Sweden was when the Swedish Environmental Protection Agency was started in 1968. The Swedish EPA was the first national authority in the world to have a direct responsibility for environmental protection in a broad perspective, and not only in nature conservation. The authority started with employing more than 200 researchers, scientists, legal advisers, administrators and engineers, persons who had high expectations from inside and outside. The Swedish

EPA became immediately a powerful organisation since it was equipped not only with a new Environmental Protection Act (SFS 1969: 387) but also with large governmental funds for stimulating private and municipal investments in the environmental protection area. The initial concerns were mainly to remove or reduce emissions from point-sources. The three most important changes in Sweden were all connected to aspects of the Swedish EPA.

The second group of important changes in Sweden was the investments in pipes for tapwater and wastewater. Pipes for wastewater allowed the use of water closets. Pipes for tapwater allowed an increase in water usage which led to the possibility to install water closets. The change from a water-carrying society to a water-pumping society implies a rapid transition towards more and more water consumption and sewerage production. The bourgeoisie of the rapidly growing cities wanted comfort and tidiness in their new homes. But it also means that for the very first time in Swedish history, the length of life in urban population was in parity with the rural population. This transition was driven by the chief health officers of the cities, normally the city doctors. The focus was partly to find means to remove pests and epidemics from the urban area. With an increased coverage of piped water in the cities, also the fire-fighting became easier, which triggered the house owners (the bourgeoisie) to support modern fire-fighting organisation and fire brigades.

Thirdly comes the first Water Act of 1919. This was an act regulating the use of water-sheds, but also opening for exploitation of waterfalls for hydropower pro-

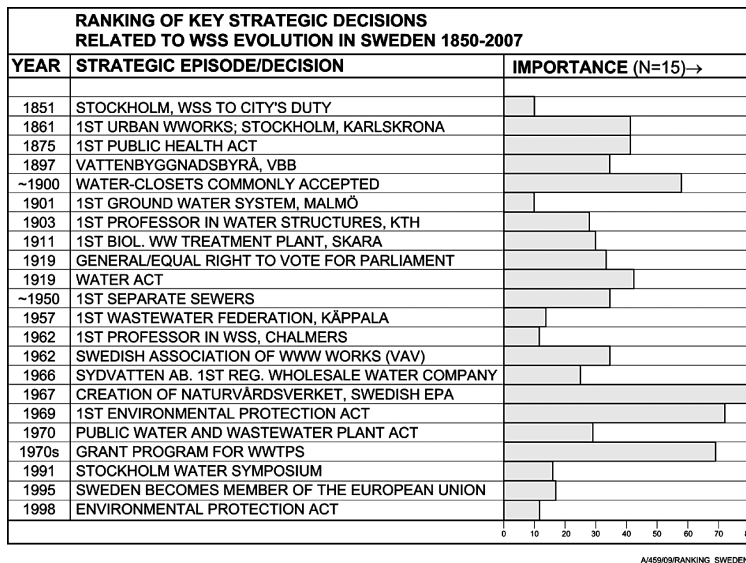


Figure 2. Key long-term strategic decisions on water supply and sanitation in Sweden, 1850–2006.



duction. The tedious and legally complicated process where landowners along the water-shed had to be involved prior the building of a storage dam and a hydro-power plants was made smoother and much easier thanks to the first water act. The water act introduced a special water court, where legal disputes concerning the water-sheds could be settled simultaneously and jointly.

On a time scale, the urbanisation process took place earlier in Sweden than in Finland. Once this process had started, the sanitary conditions for the urban population in the rapidly growing cities became worse every year and a hygienic development had to start in order to mediate the bad conditions. Looking on the time scale in general, it is possibly surprising to see how close the countries have been following each other in history. The Public Health Act was decided by the Swedish Parliament in 1875 and the Health Decree in Finland 1879. The capital of Finland had its first waterworks in operation in 1876, and in Stockholm 1861. The universal suffrage was decided in Finland 1906 and in Sweden 1919. The start-up of the Finnish Water and Wastewater Association was in 1958, whereas the Swedish Association was founded in 1962, and so forth. Inspiration and exchange in knowledge and practice has been taken place ever since the middle of the 19<sup>th</sup> century.

Not surprisingly, the views of the water experts are along the same lines, both nationally and when the two brother-countries are compared.

The survey does not claim to give a totally exhaustive view of the history of water sector in Sweden and Finland. Yet, the figures are similar in the sense that the highest number of potentially important events are legal in both Finland and Sweden. Administrative and technical changes come thereafter in both countries. Research and education ranks slightly higher in Sweden while commercial and entrepreneurial changes come higher up in Finland. Direct economical support or grant programmes from state level are unusual in both countries. The water service sector has in general to live on its own merits and its own economical strength.

## Discussion

In Finland, four out of the five most central changes are legal. First comes the Water Act of 1962. This meant an introduction of water pollution control of wastewater discharge from industry and municipalities. The act forced communities and industries to apply for permit allowing for discharging their wastewaters, and permits became stricter with time. Second to the water act comes a group of wastewater regulations and changes: The acceptance of the water closet in the beginning of 1900; the Wastewater Surcharge Act of 1974, which allowed

municipalities to increase the fees for water services in order to gather capital for necessary investments in wastewater treatment plants (Finland had never a large governmental investment grant for wastewater treatment plants, as had Sweden, and many other countries); the Health Decree in 1879 and the Local Government Act of 1875. One possible interpretation of this would be that Finnish governance is to some extent more based on legal instructions than Swedish.

As for rural water supply Finland (like Denmark) has a long tradition of consumer-managed water cooperatives whereas in Sweden (like Norway) municipalities have assumed a higher role in water services production. This is one of the questions for further research.

Although the comparison presented here must be seen as an indicative one only, we have a reason to believe that such comparative studies would increase our knowledge and understanding of water services development in a country – or between two countries like in this case – and in a way put them in historical and comparative perspective. Such awareness of water sector development in a country, let alone comparative studies seem to be rare. It is thus suggested that the study could be expanded to countries or regions with somewhat similar tradition and role of local governments.

## Conclusions

Based on the development in Finland and Sweden, first the fairly similar episodes are concluded as follows:

Most of the development paths are quite similar in the countries. The public health concerns in combination with the need for efficient fire fighting in urban areas caused both Finnish and Swedish urban officers to initiate and execute investments in water services once the urbanization process had caused living conditions to become unsafe. The Health Act in Sweden 1875 was followed by the Health Decree in Finland 1879. Inspiration and exchange in knowledge and practice has been taken place ever since the middle of the 19<sup>th</sup> century.

As for the differences we can present the following conclusions:

Sweden had a faster industrialization process than Finland. The urbanization took place earlier in Sweden than Finland, leading to an earlier need for piped water supply in Swedish cities. Once established, the tracks were, however, quite the same with a distinct municipal organization and responsibility for the water sector in both Sweden and Finland. The most important change in Sweden was when the Swedish Environmental Protection Agency was started in 1968. The Swedish EPA was

the first national authority in the world to have a direct responsibility for environmental protection in a broad perspective, and not only in nature conservation. It administered large governmental funds for stimulating private and municipal investments in the environmental protection area. The initial concerns were mainly to remove or reduce emissions from point-sources. The three most important changes in Sweden were all connected to aspects of the Swedish EPA. The Finnish parliament delegated all responsibilities for environmental point-source elimination on the municipalities.

As time passes the infrastructure ages and is likely to become the biggest future challenge – if not already now. Also retirement of WSS workers poses big problems to the whole sector in both countries. Global climate change is also a big issue when cities in the shores of rivers, lakes and seas consider their future infrastructure decisions.

In spite of having been now 200 years separated as nations it is fair to say that the evolution of water supply and sanitation in Finland and Sweden have developed along fairly similar paths. As EU members the two countries will likely face fairly similar challenges also in the future while not forgetting the subsidiarity principle and the need of considering the local conditions.

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