

was operated by hand pumps. Water was lifted by the pumps to an iron water tank with a capacity of about three cubic metres and from there it was distributed through pipes around the castle. Another important well was in the kitchen, equipped with a water tank and also a heating place and tap for hot water. In Cape Town fountains (*Illustration 5*) were erected in different parts of the town already in 1699, for slaves to draw water for their masters (Report on Cape Town Water Supply by Chas. R Barlow, October 1914, 3/CT, 4/1/1/90, ref F134/4, in Cape Town Archives Depot).



Illustration 5 Fountain from Cape Town (Source: P. Juuti).

In Finland, Turku castle was founded at the mouth of the Aurajoki River in the 1280s. Finland was a part of Sweden from early 1200s to 1809 and castles built in that era served the administrative purposes of the Swedish Crown. Turku castle was originally built in an open form of a fortified camp and the first well dates back to this era too. When the castle was extended, the kitchen was built around the well and it was kept in use. Up to this day its water is clear and of good quality and this well is considered to be the oldest remaining in Finland. In the early fifteenth century, the fortified camp was built into a closed castle and then it was divided into a main castle and a bailey. (<http://www.tkukoulu.fi/tiimalasi/tl-rakennushist.html>; Gardberg 1959, 7-8) In the mid-sixteenth century Turku castle was found to be old-fashioned, deteriorated and an inconvenient place in which to live. 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 and this project took 4000 man-hours in 1561–63. Several more wells were also built to satisfy the increasing need for water. One of them, with timber frame and stone-lined walls is still to be seen in the courtyard (Stenroos & al 1989, 60; Gardberg 1959, 309-310; http://www.nba.fi/fi/turun_linna; Puhakka & Grönros 1995, 28-29; Gardberg 1961, 7–10). (*Illustration 6*)



Illustration 6. Well from Turku Castle. (Source: P. Juuti)

Water also has a protective purpose in the castles in South Africa and Finland. The castle of the Cape of Good Hope has a moat that was finished

shortly after 1720 and in Finland, for example, the safety of the Häme castle was increased in the 1770–80s by digging massive moats around the castle.

There were several toilets in Turku castle. From the fifteenth century onwards there were three: the privy in the gatekeeper's chamber (located in the corner of the gate tower), one in the prison and the third was located in the north wing. These three were connected to the same toilet drainage system and formed an independent system. The king, other noble residents and high officials had their own privies and one is still left in the medieval great hall. These privies were usually constructed on top of the corbels or supportive beams, a sort of a bay toilet, being located partially outside the wall. However, in the Turku castle, most of these privies in the quarters of the aristocracy were built completely inside the walls. The chamber of the young noblemen from the 1540s is located near the king's hall and it had access to the bay toilet (built on beams). Similar privies were attached to the castellan's chamber and the queen's hall (Puhakka & Grönros 1995, 40, 48, 57, 59, 63, 75). None of these types of privies have survived to the present day; fires and time have taken their toll, but they can be seen in the scale model of the castle. However, other types of privies have been preserved quite well in this castle.

Ordinary soldiers did not have decent outhouses – in Finland, lakes and moats were used for this purpose as was the sea in South Africa, but at least later the commandant of the castle of Good Hope had a private toilet. Elsewhere in the old city of Cape Town wealthy people relied on water carriers and slaves to empty chamber pots. Lots of complaints were made that slaves did not do their job well in this regard. They should have emptied the buckets in the sea but instead they emptied them even in front of doors and into streets. Viktor de Klock describes this practice:

One of the most maddening habits of the slaves was that of emptying sanitary tubs into the canals, and frequently even before other people's doors, instead of into the sea" (cited in Fehr 1955, 13).

The fiscal and two burgher councillors acted twice a year as sanitary inspectors, but these inspections were only partly effective, since they were usually announced in advance and since the householder's responsibility was limited to seeing that the area immediately in front of his door was clean. (Shorten 1963, 54). It is easy to criticise such habits, but the task was not a pleasant one. It is likely that the adoption of new, improved techniques was slowed down by the fact that the owners did not have to do this duty themselves (Juuti & Wallenius 2005, 136).

Wells and toilets in the 1800s

The construction of a dug well requires planning and to some extent expertise in building. Walls are usually made of stone or wood. Wells with

stone walls are typically round. Wooden walls for wells were traditionally built in a rectangular form (similar to the timber block construction for houses) and their shape was typically square. Dug wells are suitable in sand, gravel and moraine areas, where groundwater is closer to surface. The dug well is still the most common type used in the world. Its diameter varies usually between 1-5m and the depth varies from a few metres to more than 20m. The best location for a dug well is on the lower slope of a ridge somewhat higher than the base (Juuti & Wallenius 2005, 15).

At the end of 1800s the water closet (WC) was considered an improvement that saved people from unpleasant tasks – such as emptying a chamber pot in the morning. But not everybody rushed to exploit this new invention. The wealthy burghers of Turku could hire people cheaply from the countryside and when there was a servant to empty the pots in the morning, there was no hurry to get a water closet, M. Brunow-Ruola explains. In these circles the WC and other facilities that eased everyday life were not acquired until the lady of the house was alone taking care of the household or had perhaps only one servant (Brunow-Ruola 2001, 234).

The most commonly used sources of water available to the inhabitants of Cape Town, prior to 1811, were springs on the slopes of Table Mountain or a fountain on the northern side of the Grand Parade. Another fountain was at the lower end of Caledon Square and was mainly for military use. In 1811 the Governor ordered iron pipes to be laid along the principal streets (Shorten 1963, 96-97). In 1834 there were 36 public fountains in the town area and it was reported that so much water was wasted from them that it would be advisable to erect public pumps (Report on Cape Town Water Supply by Chas. R Barlow, October 1914, 3/CT, 4/1/1/90, ref F134/4, in Cape Town Archives Depot).

Durban was established in 1835 by mostly British settlers in the middle of Nguni territory on the eastern coast of South Africa. Later on, Indian immigrants formed an important part of the town's population. There was plenty of water, but its quality was questionable. In 1854 Bishop Colenso complained that the water was the greater devil in Durban, because wells were not dug deep enough to keep organic material from polluting them. The only solution was to drink rainwater or the excellent water from the Umgeni River about 7km away (Hattersley 1956, 96-97).

In 1856, the construction of an embankment at the head of the water above the Umgeni brickfields improved the sanitary condition of the town. (Ellis 2002, 38) The first wells in Durban were probably private; the earliest public well possibly dates from the year 1864. (*Illustration 7*) Its walls were made of alternate double rows of brick and single rows of slate. It was situated in Berea Road near the intersection with Old Dutch Road. The well was rediscovered in 1968 during excavations (Bjorvig 1994, 321-322).

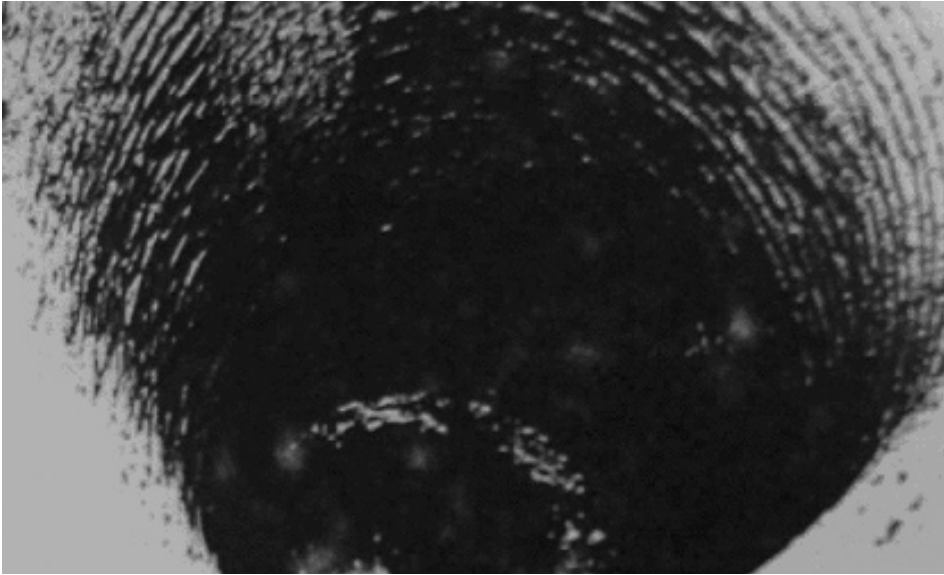


Illustration 7 Berea Road well from Durban. Source: Bjorvig.

Johannesburg was a sudden birth in the primarily rural South African Republic in 1886, after gold was discovered in the area. Its increasing cosmopolitan population and location of 70km from the nearest major river created water supply problems from the start. Gold diggers used shallow wells, but the quality of their water was poor. Already in 1887, the state commissioned the Johannesburg Waterworks, Estates and Exploration Company to ease the problems (Hattersley 1973, 238).

Sanitation needed to be organised as well. At first ‘sanitary gangs’ were formed from convicts to empty cesspits. In 1888 the Sanitary Board imposed charges for the nightly collection of sanitary pails and for the daily collection of rubbish and slop-water. It was not allowed to run dish- or bath water into the streets. Every house had a cistern in the back yard to collect such slop-water. A large wagon with several tanks came twice a week to empty these cisterns. Use of this service was compulsory and if left unpaid, it was punished by imprisonment (Hattersley 1973, 238; Leyds 1964, 32).

A British engineer, Robert Boyle, visited Johannesburg in 1890 and commented on the conditions there. He explained:

The sanitary condition of Johannesburg, though not yet all that could be desired, has been greatly improved within the last year or so [...] The pail-closet system is used. There is a splendid opening here for an improved dry-earth closet, as the system at present employed is very unsatisfactory (Sanitary Crusade, 20-21).

At the end of the 1800s and the early 1900s the refuse problem of Johannesburg was worsening. In the Transvaal Law Reports several Supreme Court cases can be found dealing with these problems. For example, in 1907 in the case of *Tobiansky vs. Johannesburg Town Council*, it is apparent that there really was a serious problem with refuse and overall sanitary conditions in the town and especially in the township of Sophiatown. A portion of Waterval farm was used wrongfully [...] as a depositing site for night-soil, slop water and carcasses of animals, and . . . consequently offensive, poisonous and unwholesome vapours and noxious matters issued and proceeded from the site and spread and were diffused [...] to properties, rendering them unwholesome, dirty and uncomfortable to live in [...] and seriously endangering [...] health (*Transvaal Law Reports 1907, Tobiansky v. Johannesburg Town Council*, p. 134-156).

The Waterval area was situated near a major public road, Old Krugersdorp Main Road. It was used for this purpose obviously since 1894 and became a serious health risk by 1907. These practices and problems were common in the growing cities of the South Africa. (*Transvaal Law Reports 1907...*) Even on the other side of the world – in Tampere, Finland – similar cases were reported. (Juuti 2001, 66-87).

City fires were also a big problem. Before the time of waterworks, Finnish cities burned down frequently due to an insufficient amount of water and because of the dominant use of wood as a building material. In South Africa this problem was not as comprehensive as in Finland. There are however indications that Cape Town experienced numerous fires since the seventeenth century (Nikula 1972, 40-41; Worden et al 1998, 112).

First WCs in South Africa and Finland

The first reference to WCs in Cape Town is from the year 1814, when Lord Charles Somerset ordered four patented water closets for Government House at a cost of £230. They, however, did not become general, even in the larger residences, until the second half of the century (Hattersley 1973, 147).

In 1887, in Grahamstown, the old cesspool system was replaced by the pail system; at nights the sewage was emptied and removed to outside of the city, where it was covered up with soil (*Souvenir of Grahamstown*, 35, 39). A few years later, in 1891, Robert Boyle mentioned the use of pail-closet systems in Kimberley, Johannesburg, Pretoria and Durban. There were also plans for switching to water-borne sewerage system in Kimberley and Durban (*Sanitary Crusade*, 12, 20, 23 and 26).

Some progress was made in Durban in 1896, when an effective sewerage system became operational. Lavatories were provided throughout the town. There was also an outfall for waterborne household sewage, which was discharged during the first few years into the sea at the ebb tide (Bjorvig 1994, 327-328). In January 1906 there were problems with European-style water closets in Durban harbour. One of the disposal

pipes was blocked and the plumber found two bottles, one shirt and two pair of socks inside. This led to investigations that involved the fort captain, harbour engineer, wharf master and even the water police. It is not known whether the offenders were found (Pietermaritzburg Archives Repository, NHD II/1/96 106/1906). A month later the same closet was under discussion again when the mechanical engineer proposed on 5 February that the iron seats should be replaced by wooden ones (Pietermaritzburg Archives Repository, NHD II/1/95 28/1906).

In Finland, 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 was completed in 1883 in the house of the Bank of Finland. Stockholm, in Sweden, 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, 224-225). 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. The owner and builder of the toilet, F. W. Gustafsson, explained:

Closets [...] are equipped so that nothing but water can go through them to the city ditches, because there's a cesspool under the closet and there's a 4-inch (10mm) diameter pipe with a filter (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 forbade the running of any impurities from closets to the sewer network (Laakkonen 2001, 48-50).

Discussion and Conclusions

Today, there are several pressing environmental issues in South Africa and Finland in respect of water issues. There is a lack of natural water resources. This requires extensive water conservation and control measures. Growth in water use is much faster than the available, and also the anticipated future supply. There is the severe pollution of rivers as a result of agricultural, industrial and domestic discharges. Air pollution is resulting in acid rain. There are many examples of soil erosion and desertification is still the order of the day. Both South Africa and Finland have to cope with these problems simultaneously.

The greatest challenge now in Finland is to find a solution for complying with new wastewater treatment regulations in areas of scattered

settlements. The best choice might be the complete recycling of nutrients, which requires replacing the water toilet by the compost toilet with urine separation and a significant change of attitude. The second-best solution would be leading the wastewater to the sewerage works, but long distances make this almost impossible. Finland has plenty of water, so there's no need for two-pipe systems, where for example the flushing water is of lower quality. Rural areas without sewer networks should seriously consider abandoning the flushing toilet altogether. In urban areas, with established networks, it is not reasonable to replace the existing infrastructure with a new system. In general, the large wastewater treatment plants work well. But for new areas the system based on composting toilets should be studied and developed further.

In 2004, Transparency International (2001: www.gwdg.de/~uwww/icr.htm) ranked Finland – again, the fifth time in a row – as having the lowest perception of corruption in the world. Also South Africa made out very well in this evaluation, it was second in Africa. It's not co-incidental that the most corrupt countries – without pointing a finger directly at them – are also the countries with the worst water governance.

Outhouses and wells remained in use in cities for some time after the establishment of central water supply systems. Water and sanitation services reached the suburban areas slowly and in some areas of scattered settlements they still are not available. So in 2004, 650 000 private wells (500 000 simple dug wells and 100 000 artesian wells) remain in Finland and the majority – probably two-thirds – require immediate maintenance to improve the quality of the water. These figures include both the main households and the holiday homes. But a little over 90 per cent of all Finns get water of good quality from local waterworks distributed to their permanent address. In South Africa, the backlog in supplying people with access to safe drinking water is a national priority and scheduled to be eliminated in 2008 (<http://www.info.gov.za/speeches/2004/04051015151001.ht>).

The conditions have not always been as good and surprises may occur. But all in all, the situation is quite good in both countries. In Finland in the early 2000s the waterworks provided 250ℓ p/d per capita for private use. For industrial purposes, the figure is 20 000ℓ, but industry gets only a small amount of its water from public waterworks. The total consumption of communities and industry is 7,5 per cent of the renewable water resources. There are even in suburban areas 40 000 people and in sparsely populated areas more than half a million people who remain outside the water supply network. Approximately 300 000 people have some impurities in their domestic water and one million people living in houses have their own sewer systems, without a connection to a municipal sewer system.

The reason for this favourable situation in both countries is that the right choices were made in the past. The nineteenth century was a time of increasing environmental problems in Finnish and South African cities. Old water supply systems became inadequate when the population increased. The contemporary term for the situation was the ‘water question’ – nowadays it is called the ‘water issue’ – and the answer to the issue was sought for decades. Developing countries of our time confront this same acute problem.

Water management, i.e. water supply and sewerage and waste management, are essential elements of the development of communities. Together they are called environmental services. The environmental services are justified in themselves and by expecting direct and indirect benefits. The concrete infrastructure is the basis for economic and social systems, which can be vulnerable to environmental changes. The success of urbanization and the modernization of the rural areas are closely connected to finding solutions for environmental services. A well and an eco-toilet in areas with scattered settlements will provide in future ecological solutions. Investing in water supply and sewers is always worthwhile.

Water supply and sewerage are vital, although mainly invisible, parts of the economic-technical infrastructure of a community. Environmental services are essential for public health, hygiene, the protection of the environment and industry. Water supply and sanitation, sewerage and waste management are the basic issues of environmental history and studying them can give new ideas for surviving the problems caused by increasing standards of living and populations. The solution for environmental services is simultaneously a solution to the problem of how to live and settle successfully, as well as how to create better surroundings. Wells and toilets are an essential part of durable solutions for the future.

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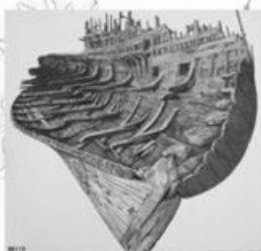
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