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From fertiliser to waste, land to river: a history of excrement in Brussels

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During the second half of the 19th century, the River Senne became the preferred outlet for wastewater in Brussels. While at the beginning of the century, faecal matter was collected and sold to farmers as fertiliser, the gradual adoption of mains drainage had the direct effect of causing a lasting increase in pollution levels in the river.

This research focuses on this transition. It questions the reasons why excrement recycling was abandoned and how the Senne became the new recipient for some of the wastewater in the capital.

Through the analysis of the discussions and projects in connection with the management of faecal matter, this study is aimed at better understanding the transformations in the relationship between Brussels and its environment which took place during the 19th century.

It explores the major sanitation works in Brussels by focusing on a little known aspect, i.e. the project for broad irrigation with wastewater.

This article therefore highlights the role of planned or built technical infrastructures in the realisation of urban projects and the way in which the impact of Brussels on its environment was modified on a long-term basis.

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Introduction

1. During the second half of the 19th century, the River Senne became the preferred outlet for wastewater in the Belgian capital. While at the beginning of the century, organic waste and faecal matter in particular were collected and used as fertiliser for periurban agriculture, the gradual adoption of mains drainage put an end to the system for recycling refuse. This transformation had the direct effect of causing a lasting increase in pollution levels in the river. We are the heirs of this situation. Let us point out that the first sewage treatment plant in Brussels was set up only in 2000, and the second one only in 2007. Until the beginning of the 21st century, sewage from the Belgian capital was therefore dumped into the River Senne with no prior treatment.

2. Furthermore, Brussels is still struggling to meet the environmental objectives of the European Union as laid out in the Water Framework Directive (WFD), and to reduce the impact of human pressure on the hydrographic network [IBGE, 2011]. This article examines how the river was transformed into an outlet. How did the Senne – a small waterway with a flow of just a few m^3 per second – become the recipient of part of the excrement in Brussels? Why was the sewage treatment system for Brussels abandoned? How is it that a substance which was once in demand for its fertilising qualities became a new source of pollution? In what conditions did this transition take place?

3. In recent years, the notion of metabolism has been the object of growing interest on behalf of historians with respect to the impact of cities on their environment [Barles, 2005; Hough, 1995; Tarr, 2002]. This concept – borrowed from life sciences – allows the study of the transformation of the relationship between cities and their environment by focusing on the exchanges and flow of matter. Urbanist and historian Sabine Barles demonstrated in particular how the break in metabolic relationships between Paris and its surroundings via a recycling economy marked the advent of urban 'waste' [Barles, 2005].

4. This article discusses the way in which this break occurred in the Belgian capital, by focusing in particular on the route of excrement. With its dual nature – fertilising and pathogenic – faecal matter is a topic which demonstrates the tensions which existed in the political arenas of Brussels during the 19th century. While the city was experiencing unprecedented demographic growth, the management of excrement was at the heart of two major issues: on the one hand, that of food supply; on the other hand that of hygiene. In order to feed a growing urban population, agricultural production had to be increased by providing the land with matter which would maintain or increase its fertility, such as excrement. Furthermore, in order to halt the risks of an epidemic at a time when urbanisation – characterised by the concentration of people and their excrement [Fressoz, 2012] – constituted the source of new plagues, pathogenic sources had to be evacuated from the cities.

5. Through the analysis of city council discussions recorded in municipal reports, our aim is to present the way in which this dual challenge was negotiated in Brussels. By studying the technical mechanisms planned or implemented during the 19th century for the management of faecal matter, we shall see that the transition from sewage collection to its evacuation in the river was not the fruit of a consensus determined by the 'best' existing technology. Furthermore, the dumping of sewage from the Belgian capital into the Senne without being treated, did not take place inadvertently.

6. We thus explore Brussels' sanitation plan from a new angle: instead of focusing our attention on the vaulting of the Senne, which has been studied before [Abeels, 1983; Demey, 1990; Fincoeur *et al.*, 2000; Leblicq 2000], we look at a little known aspect of the sanitation plan, i.e. broad irrigation with wastewater. As this project was not completed, it played a deciding role in the break in the metabolic link between Brussels and its surroundings.

7. This article is structured in three parts. The first discusses how the management of faecal matter – which met the needs of agriculture at the beginning of the 19th century – was redefined as a health problem and how excrement made the gradual shift from the sewage pit to the sewer. The second looks at the way in which the 'English system' of broad irrigation with wastewater was considered as a solution to the pollution of the Senne and allowed the realisation of works for the sanitisation and enhancement of the image of Brussels. And finally, the third part explains the reasons why the project for broad irrigation with

wastewater was abandoned and the way in which the Senne became the direct outlet for wastewater from the Belgian capital.

1. How did excrement evolve from being a source of wealth to a source of pollution, making the gradual shift from the sewage pit to the sewer?

Figures 1 and 2. Various techniques used during the 19th century in the application of human excrement on the land. Source: Liger, F., 1875. Fosses d'aisances, latrines, urinoirs et vidanges. Paris: J. Baudry, Libraire-éditeur, pp. 366-367.

8. At the beginning of the 19th century, the removal of urban excrement was an activity which was essentially regulated by the needs of periurban agriculture and the recycling economy [Barles, 2005]. Due to limited resources in terms of fertilising, organic waste and in particular excrement were used to fertilise the fields [Brunt, 2007; Simmons, 2006; Tarr, 1975].

9. In Brussels, the *Ferme des boues*, a street cleaning service, was responsible for emptying latrines – common sewage pits usually located in courtyards or gardens.[1] The faecal matter was taken to the *Ferme des boues*, located north of the Pentagon along the canal, and was poured into pools in order to activate the evaporation of the overabundant amounts of water. It was transformed into 'urban manure', sold to farmers and transported by waterway to the neighbouring fields [Valento Soares, 1994].

10. Until well into the 19th century, excrement had a market value and constituted a substantial source of revenue for the municipal administration. The *Ferme des boues* ensured a metabolic link between the city and the fields, and was an essential part of what historian Pierre Saddy refers to as the 'refuse cycle'. From waste to urban manure: organic matter returned to the earth is transformed into foodstuffs [Saddy, 1977].

11.However, in the 19th century, the *Ferme des boues* encountered more and more difficulties in selling its urban manure. Due to urban growth, the volume of excrement increased considerably (between 1831 and 1846, the population of Brussels increased from 140,322 to 231,634 inhabitants [Daelemans, 1989: 212]) and the *Ferme des boues* was faced

[1] Chevalier M. A., 1840. Assainissement des villes. Entretien avec les membres du conseil central de salubrité publique de Bruxelles, in *Encyclographie des sciences médicales.* Brussels: Société encyclographique des sciences médicales. Volume 4, ch. 22 to 24, pp. 16-18.

with greater competition. Firstly, there was competition from the neighbouring cities (Antwerp, Leuven, etc.) which also tried to sell their excrement. Secondly, there were new sources of fertiliser which had appeared on the market (guano, mineral fertilisers, chemical fertilisers) and which contributed to the decrease in the demand for urban manure.[2]

12. The difficulties in selling the stock continuously and the rising accumulation of excrement in the urban centre clearly led to the questioning of how faecal matter was managed. This questioning became more pronounced following the first cholera epidemics, thus redefining the management of excrement as a health problem.

13. The measures implemented in 1832 by the *Commission médicale locale et sanitaire centrale* (local medical and central health committee) to stop the spread of the disease, illustrate the importance given to the miasma theory. The committee pointed out that 'all emanations from plant and animal matter [were] dangerous' and that in order to prevent disease 'the accumulation (sic) of refuse [had to] be prevented, by removing it as often as possible.'[3] Infection was associated with the characteristics of the environment, and the odour created by decomposing matter was considered as the quintessence of the pathological process [Jorlan, 2010; Frioux *et al*., 2011]. In order to ensure the survival of inhabitants, the city had to be sanitised by eliminating – or at least by moving away – the sources of infection [Gaudillère, 2006].

14. In Brussels, after the epidemic of 1832, the city council examined the possibility of moving the *Ferme des boues* outside the city walls.[4] But above all, after the epidemic of 1848, when health became a true lever for political action in Belgium, major investments were made for the implementation of a modern sewer system [Honnoré, 2005].

15. The survey of works indicates that between 1848 and 1851, there were 5,582 metres of new pipes installed.[5] However, the scope of the system (in 1848, Brussels already had 45,490 metres of sewers)[6] did not change as much as its typology and the functions assigned to it. In order to ensure the salubrity of cities, the sewer system had to meet new requirements. They were established during the first health conference held in Brussels in 1852. In particular, the sewer system had to provide easy and constant flow of matter, prevent the emission of odours and be completely watertight.[7] In accordance with these principles, rather than follow the slope of the streets, the new sections of sewer were levelled and the porous pipes were coated with hydraulic mortar.[8] This new construction method illustrates the new functions attributed to the sewer. While the system was first intended essentially to direct and allow seepage of run-off water, from 1857 the *Buildings Regulation* integrated measures favouring 'mains drainage', i.e. the sending of domestic waste water and faecal matter to underground

[2] City of Brussels, 1862. Question de la régie ou de la mise en adjudication proposée par M. le Conseiller Cattoir. In : *Bulletin du conseil communal de la ville de Bruxelles*. Brussels: Imprimerie de J. Coché-Mommens. Session of 18 October, volume 2, p. 324. For the sake of simplicity, we shall use B.C.B. to designate the *Bulletin du conseil communal de la ville de Bruxelles*.

[3] Commission médicale locale et sanitaire centrale, 1832. Instruction populaire sur le choléra-morbus du 12 avril 1832. In: *Recueil des ordonnances, règlements, arrêtés, avis, etc., émanés de la Régence de la Ville de Bruxelles pendant l'année 1832*. Brussels: Hez Bols-Wittouck, p. 6.

[4] City of Brussels, 1836. Déplacement du dépôt des immondices. Rapport fait au Conseil communal de la ville de Bruxelles par le Collège échevinal en conformité de la loi du 26 mars 1836. In: *Recueil des ordonnances, règlements, arrêtés, avis, etc., émanés de la Régence de la Ville de Bruxelles pendant l'année 1836.* Brussels: Hez Bols-Wittouck, p. 202.

[5] Van Mierlo C., 1878. *Notice descriptive et historique concernant les égouts et la Senne à Bruxelles*. Brussels: Baertsoen, pp. 25-33.

[6] Ibid., pp. 15-24.

[7] Unknown author, 1852. Congrès général d'hygiène en 1852. In : *La Santé, Journal d'hygiène publique et privée. Salubrité publique et police sanitaire*. Brussels: Imprimerie de G. Stapleaux. Quatrième année, p. 71.

[8] Van Mierlo C., 1878. *Notice descriptive et historique concernant les égouts et la Senne à Bruxelles*, Brussels: Baertsoen, p. 13.

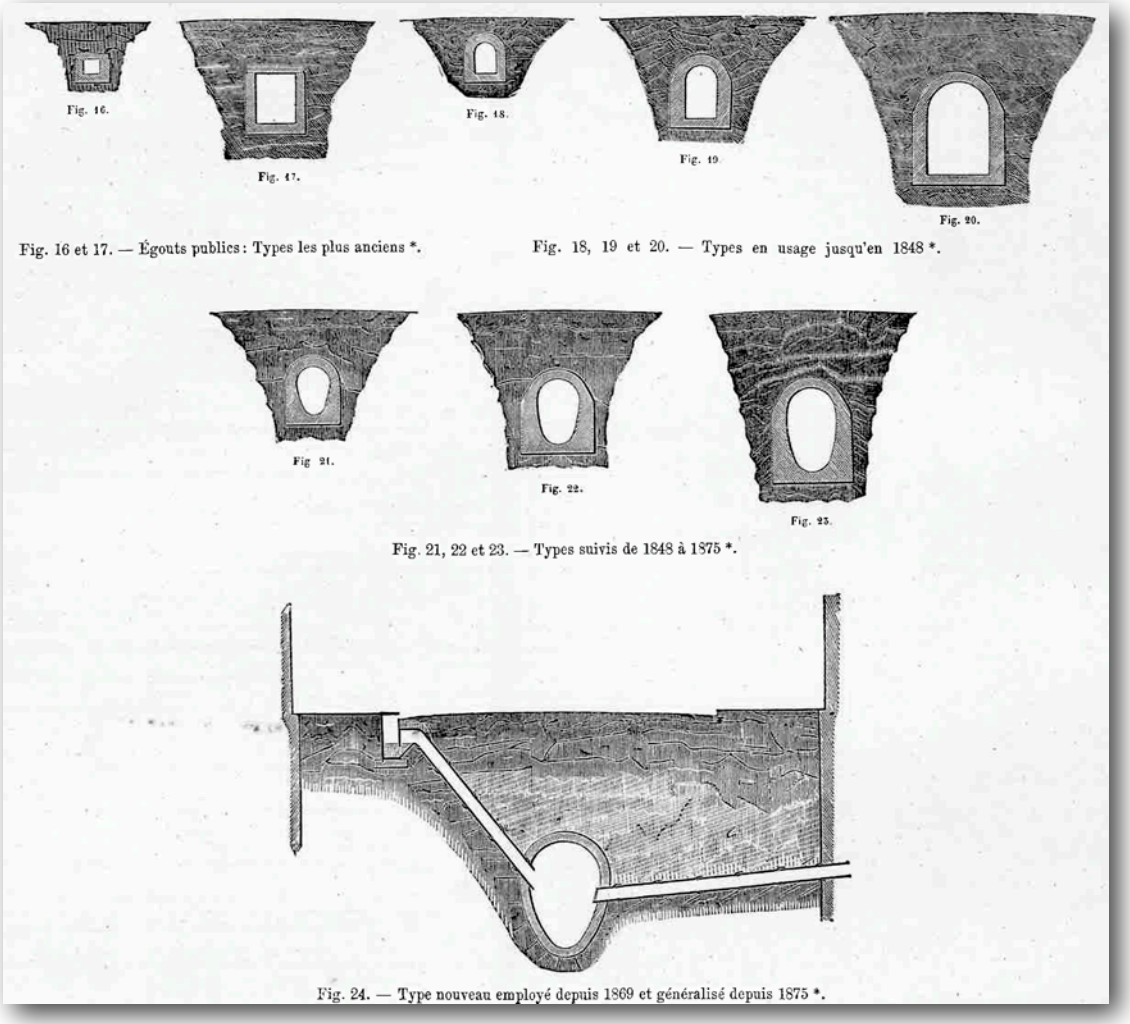

Figure 3. Different methods of sewer construction in Brussels. Source: Van Mierlo C., 1878. Notice descriptive et historique concernant les égouts et la Senne à Bruxelles. Brussels: Baertsoen, p. 4.

pipes.[9] In addition to being a rainwater drainage system, the sewer system gradually became a means of evacuating wastewater.

16. These measures marked an important change in the organisation of the flow of waste. Faecal matter made the gradual shift from the pit to the sewer, and the pipe replaced the *fermier des boues* in his task of collecting and transporting excrement. The concerns related to the agricultural value of human excrement did not disappear, however, and the destination of the new sewer system became the object of many reflections.

2. How did the 'English system' provide a solution to the pollution of the Senne and allow the realisation of works for the sanitisation and enhancement of the image of Brussels?

17. In mid-19th century industrial Europe, while the urban areas were experiencing unprecedented demographic growth and the Malthusian threat of overpopulation was hanging over the cities, the increase in agricultural productivity and the maintenance of cycles of matter between the city and its environment were major concerns [Foster, 2011]. They were strongly expressed in the widely distributed works by German chemist Justus von Liebig on the role of nutrients (nitrogen, phosphorus, potassium) in the growth of plants. As these elements exist on earth in limited quantities, the 'law of return' (the return to the earth in the form of fertiliser, of matter consumed by humans in their food), inspired by Lavoisier's law of conservation of mass (according to which nothing is created, nothing is lost and everything is transformed), constitutes an essential condition of rational agriculture according to Liebig [Bensaude-Vincent & Stengers, 2001]. On the contrary, modern sewer systems – which represent a waste of nutrients and result in the pollution of rivers – were strongly criticised.[10]

[9] City of Brussels, 1857. Révision du règlement sur les bâtisses. In : *B.C.B*. Session of 14 February, volume 1, pp. 101-115.

[10] Liebig, J. von, 1865. *Letters on the Subject of the Utilization of the Metropolitan Sewage, Addressed to the Lord Mayor.* London: Lindmark G., p. 20.

18. In Brussels, as in most cities with a sewer, the river was the preferred outlet for wastewater. During the 1860s, while mains drainage was becoming more widespread, the dumping of faecal matter in the Senne was criticised by the local authorities and the municipalities downstream as being one of the main causes of the pollution of the waterway.[11]

19. In 1861, the Province of Brabant, the City of Brussels and the central state instituted a commission of the 'three powers' to study the means to resolve the problem. Many projects were proposed to protect the population from the river's torments, separate the wastewater from the river water and favour the agricultural recovery of nutrients drained away by the sewer system. However, a consensus was not reached [Demey, 1990]. Finally, in 1865, the Brussels city council adopted the plan for the sanitisation and enhancement of the city's image proposed by the architect Léon Suys. The plan was to vault the river where it ran through Brussels and to separate it from the wastewater by adding two sewer mains. On the surface, this project had the advantage of allowing a series of prestigious developments. However, it left many issues unresolved. Above all, it did not deal with the problems caused by the pollution of the Senne downstream from Brussels. In order to benefit from the financial support of the higher authorities, which were answerable for the interests of municipalities downstream from the city, Brussels also had to ensure the treatment of wastewater before it was poured into the river.[12] The problem was not simple, as in the mid-19th century the different physical (settling, filtration) and chemical (disinfection, precipitation) means for water treatment were not very effective or were very costly [Boutin, 1986]. The 'English system' of broad irrigation with wastewater would offer new perspectives.

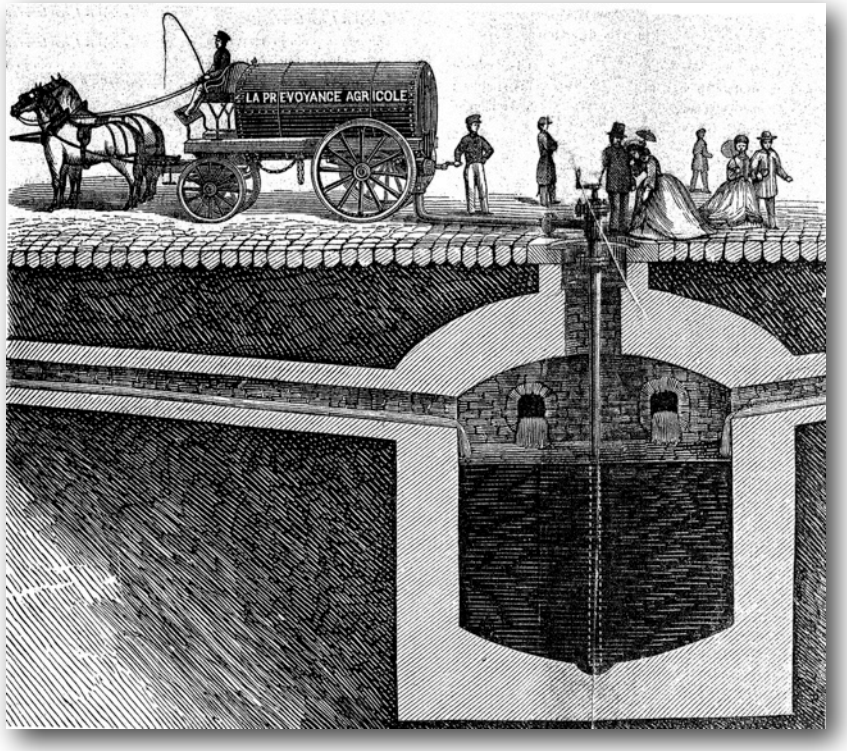

Figure 4. Prévoyance agricole project aimed at reconciling health and agriculture interests. Source: La prévoyance agricole, non daté. Programme de la société. La ville assainie et les campagnes fertilisées. Brussels: E. Guyot.

[11] Province of Brabant, 1860. *Corruption des eaux de la Senne. Discussion du rapport sur les mesures à prendre pour faire cesser les inconvénients causés par la corruption des eaux de la Senne. Discussion au conseil provincial*. Brussels: Imprimerie Bols-Wittouck. Session of 20 July, p. 10.

[12] Province of Brabant, 1866. *Assainissement de la Senne. Rapport présenté par M. Barbanson au nom de la Commission spéciale instituée le 10 avril 1866*. Brussels: Imprimerie Bols-Wittouck, p. 13.

20. In 1852 in Brussels, during the first health conference, Frederick Oldfield Ward, ambassador of the English reformer Edwin Chadwick, presented a new model for the sanitisation of cities. Its fundamental principle was the continuous flow between the city and the countryside: 'Water which falls on the hills in a pure state, undergoes natural filtration through the sand, enters the urban distribution pipes, arrives at each floor of each house in the city; and after being used by the population, it goes away, full of fertilising waste, which is taken away before it has time to begin fermenting. This fertiliser is carried along in the irrigation pipes and is deposited into the ground; it then goes through the ground and enters the drainage pipes, where it finally enters the rivers. The rivers take it to the ocean, where it evaporates due to the heat of the sun, and then falls on the hills in the rain, entering the mains once more, thus beginning its vast and useful cycle again.'[13] In this model, technology is not the antithesis of nature, but its realisation and prolongation in a new form. The mains systems constitute an extension of hydrographic networks, and mains drainage ensures the return to the earth of the nutrients found in excrement. In addition, Ward supported that the wastewater spread on the land would be filtered and sanitised before returning to the river.

21. In 1852, this new model received a 'warm welcome' from the conference reporters, but they felt that it was 'too new' to give an opinion on the subject.[14] In 1866, while the City of Brussels was in negotiation with the state and the Province of Brabant on the subject of sanitation works in the Senne downstream from Brussels, a special committee was sent to England to observe the results of irrigation operations carried out there.

22. After crossing the sewage farms in Blind Corner, south of London, the committee reporters noted that they were struck by 'the growth and vigour of the grass [...] and of the clarity of the water from the canals', which they found 'had neither an odour nor a taste suggestive of its origin.'[15] The committee concluded that 'the system used had no disadvantages with respect to the surroundings and that it lacked nothing in terms of water treatment.'[16]

23. Based on this report, a preliminary draft for the creation of a sewage settling and treatment plant was presented on 10 April 1866 to the Brabant Provincial Council. Northeast of Brussels in Haeren, 'the mains [would] pour its contents into reservoirs at the plant. The solid matter [would] sink to the bottom of the reservoirs: the water [would] rise

[13] Ward M. F. O., 1852. *« Circulation ou stagnation ? », Congrès général d'hygiène, à Bruxelles, première séance, 20 septembre 1852, discours de M. F. O. Ward (Angleterre)*. Brussels: Librairie universelle de Rozez, p. 6.

[14] Unknown author, 1852. Congrès général d'hygiène en 1852. In : *La Santé, Journal d'hygiène publique et privée. Salubrité publique et police sanitaire*. Brussels: Imprimerie de G. Stapleaux. Quatrième année, p. 123.

[15] City of Brussels, 1866. Deuxième rapport de la commission chargée de constater les résultats des opérations de *sewage* en Angleterre. In : *B.C.B*. Session of 17 March, volume 1, p. 253.

[16] Ibidem.

above the solids, and [would] only be released after going through many filters, and after having undergone the beginning of a treatment. On leaving the plant, it [would] be spread on grassed surfaces; the contact with the vegetation [would] finish the treatment, and the odourless and clear water [would] be returned to the river which [would] not be harmed by it.'[17] By associating different technical procedures (settling, filtration and spreading) this system had an essentially sanitary aim. It was focused above all on ensuring the treatment of wastewater.

24. The works were entrusted to the English company *Belgian Public Works Company Limited* which was already in charge of sanitation works in Brussels [Demey, 1990]. The final contract was signed with the Council on 15 June 1866. It stipulated that the city would provide the company with the grassed surface or pasture required 'for a treatment as perfect as in Blind Corner'[18] and that all of the works would have to be carried out within four and a half years.[19]

25. In 1871, the interior sanitation works in Brussels were complete. 2,150 metres of the Senne were vaulted and 17,775 metres of mains were installed.[20] However, downstream from the capital, nothing had been set up yet for wastewater treatment. Until the treatment plant was built, drainage machines were set up 'temporarily' near the Haeren mains to pump the wastewater and pour it in the Senne.[21]

Figure 5. Overall plan for works to be carried out in the sanitisation of the Senne. Source: AVB, Belgian Public Works Company limited, Assainissement de la Senne. Plan d'ensemble des travaux, 1867-1869. Plans portefeuille n° 534.

[17] Province of Brabant, 1866. Assainissement de la Senne. Rapport présenté par M. Barbanson au nom de la Commission spéciale instituée le 10 avril 1866. Brussels: Imprimerie Bols-Wittouck, p. 19.

[18] City of Brussels, 1866. Assainissement de la Senne. Contrat définitif. In : *B.C.B*. Session of 15 June, volume 2, p. 127.

[19] Ibidem.

[20] Van Mierlo C., 1878. *Notice descriptive et historique concernant les égouts et la Senne à Bruxelles*. Brussels: Baertsoen, pp. 8-9.

[21] City of Brussels, 1880. Utilisation des eaux d'égout. Communication de M. l'Echevin Delecosse. In : *B.C.B*. Session of 12 April, volume 1, p. 381.

26. In 1873, a new project was submitted to the city council by two engineers from the department of civil engineering, Charles Van Mierlo and Léon Derote. In their study, it was no longer only a matter of sanitising wastewater, but also of using it to irrigate the fields. In order to absorb and put to use all of the wastewater from the mains in Haeren whose daily flow was estimated at 86,400 m^3, the authors estimated that an area of 4,000 hectares of land would be necessary. The land proposed for the application of this system was located on the Loo and Peuthy plateaus, an infertile area located near the Haeren mains[22].

27. Based on the studies conducted by Liebig in particular on the nitrogen content of human excrement, Van Mierlo and Derote calculated that for a population of 350,000 inhabitants, 7,875 kilogrammes of nitrogen were produced each day, which in terms of revenue amounted to 5,748,750 francs per year.[23] This is why, according to them, the city should have benefited from its wastewater by selling it as liquid fertiliser.[24] Contrary to the preliminary draft of 1866, this involved combining interests related to hygiene and agriculture, and allowing the city to make its investments profitable by selling the wastewater from its sewer system.

3. Why the project for broad irrigation with wastewater was abandoned, making the Senne the outlet for wastewater from the Belgian capital

28. Having been consulted on the project by the municipal administration, the minister for public works considered that before taking a final decision 'it would be wise to carry out a demonstrative trial by applying the proposed irrigation system on a small area.'[25] In accordance with this recommendation, the city planned to irrigate 50 hectares of land located on the Loo plateau on a trial basis.[26] However, on 29 November 1875, the city council, which had to approve the budget allocated to these trials, was divided regarding the result of the experiments conducted abroad. The case of Gennevilliers, near Paris, was particularly controversial.

29. Since 1870, the city of Paris had been spreading its wastewater over 40 hectares on the peninsula of Gennevilliers. While the first reactions to this undertaking put forward the prosperity of the fields fertilised this way, the local residents began to voice their complaints, which included the infection of the water table, cases of intermittent fever and, in the summer of 1874, a dysentery epidemic [Carnino, 2013]. For some of the municipal councillors, this example illustrated that 'science

[22] Derote L., Van Mierlo C., 1873. *Assainissement de la Senne : utilisation des eaux d'égout de l'agglomération bruxelloise ; usine de Haeren; irrigation des plateaux sablonneux de Loo et de Peuthy*. Brussels: Imprimerie de Ve Baertsoen et Ce, Succrs de Bols-Wittouck, 1873, pp. 91-97.

[23] Ibid., p. 103.

[24] Ibid., p. 91.

[25] City of Brussels, 1875. Travaux de la Senne. Usine à Haeren. Rapport déposé par M. le Bourgmestre, au nom du Collège. In : *B.C.B*. Session of 15 March, volume 1, p. 173.

[26] Ibid., p. 174.

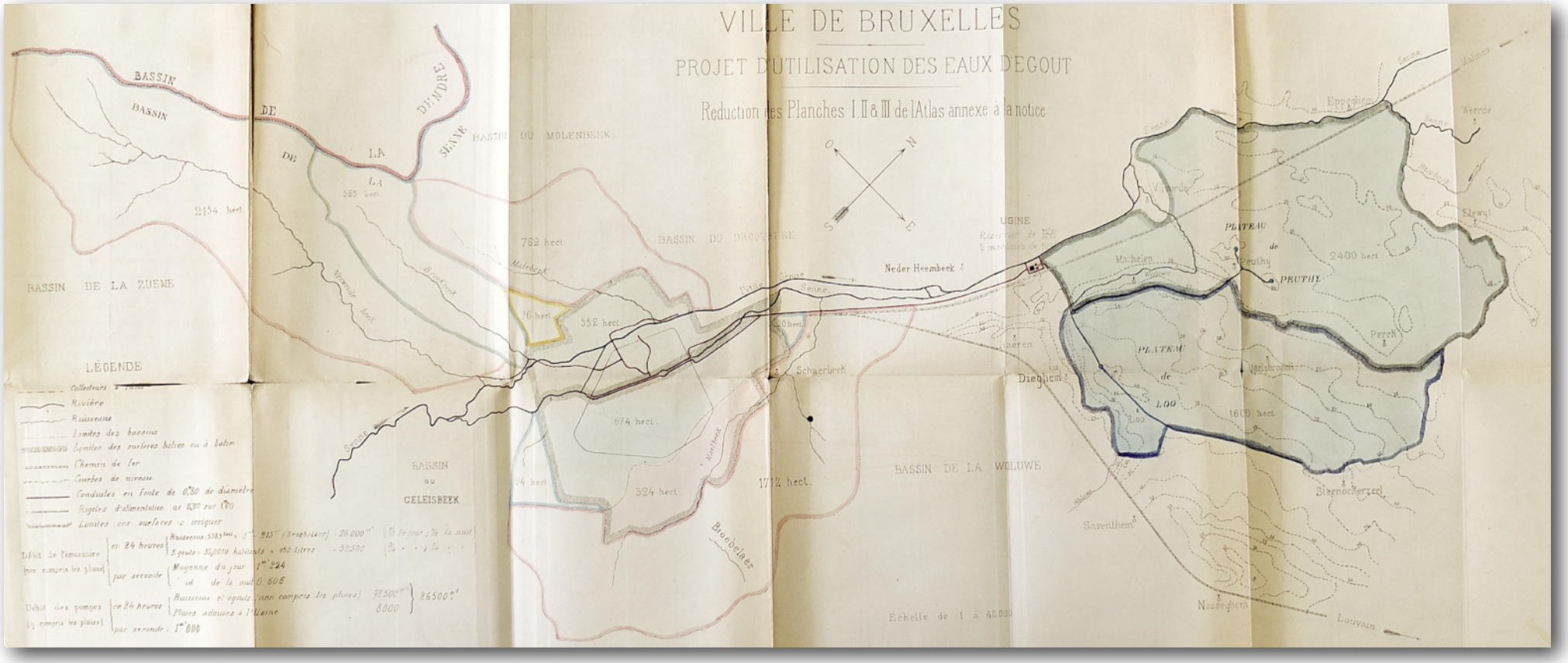

Figure 6. Project for broad irrigation with wastewater by Charles Van Mierlo and Léon Derote (1873). Source: Derote L., Van Mierlo C., 1873. Assainissement de la Senne: utilisation des eaux d'égout de l'agglomération bruxelloise; usine de Haeren; irrigation des plateaux sablonneux de Loo et de Peuthy, Brussels: Imprimerie de Ve Baertsoen et Ce, Succrs de Bols-Wittouck, 1873, illustrations in annexe.

[had] not expressed an absolute and definite opinion'[27] on the best way to treat wastewater, and that it would be wise to 'wait until the other cities – especially Paris – [had] finished their costly experiments [...] without spending a penny.'[28] Others retorted that 'it [was] impossible to keep exposing the residents along the Senne to infection' and that 'even if there [had] not been a positive experience in Gennevilliers, trials [were] necessary [there].'[29]

30. Faced with these differences, the mayor ensured that 'the experiment [did] not commit [them] to anything in the future, and that it [was] an experiment carried out on a large enough scale so that the results [could be] assessed.'[30] Presented as a moderate solution and a transitional stage which would not in any way influence future decisions, the project to conduct spreading trials on the Loo plateau was accepted.

31. Vegetable crop trials were conducted by the City of Brussels in Haeren as of 1875, and on the Loo plateau as of 1878.[31] In October 1879, the members of the city council went to the site to observe the results of this undertaking. According to the alderman for finances, 'the experiment [had] not been a big success, as the expenses [had] outweighed the takings thus far.' He pointed out that 'if the financial aspect alone [was] considered, [he] would feel obliged to present the council with a proposal to put an end to these more or less costly experiments.'[32]

32. Therefore, in order to study the different possible alternatives in Brussels, a special committee was established in 1880 as part of the city council. In its report of 4 March 1882, two new projects for wastewater treatment were considered.[33] The first, by the man by the name of Babut du Marès, proposed the irrigation of De Kempen, 29 kilometres from Brussels. However, for the committee, the problems posed by spreading in economic and health terms were obvious. They pointed out that the company in Croydon was bankrupt and London was pouring its sewage into the bottom of the Thames, and that the city of Paris had 'done nothing but infect an entire region and was forced [...] to pay considerable damages to victims.'[34]

33. The second project evaluated by the committee was the work of an industrialist named Mennessier. He proposed the establishment of a settling plant in Haeren using chemical processes. This project was also challenged by the committee on the grounds that chemical treat-

[27] City of Brussels, 1875. Discussion et vote des articles réservés du budget de 1876. In : *B.C.B*. Session of 29 November 1875, p. 443.

[28] Ibidem.

[29] Ibid., p. 451.

[30] Ibid., p. 452.

[31] City of Brussels, 1880. Utilisation des eaux d'égout. Communication de M. l'Echevin Delecosse. In : *B.C.B*. Session of 12 April, volume 1, p. 381.

[32] City of Brussels, 1880. Utilisation des eaux d'égout. Concessions demandées. In : *B.C.B*. Session of 20 February, volume 1, p. 86.

[33] City of Brussels, 1882. Eaux d'égout. Rapport présenté, au nom de la Commission spéciale, par M. le Conseiller Allard. In : *B.C.B*. Session of 1 May, volume 1, pp. 407-453.

[34] Ibid., p. 424.

ment provided no guarantee, as 'one hundred and thirty-two processes [had] been tried without success.'[35]

34. However, the special committee did not content itself with the study of these projects. By going on to analyse the legislation, it established that no law was opposed to 'the sewage from a city mixing naturally with the water in a river which [would] pull it away and pollute and infect the water downstream.'[36] Moreover, the committee maintained that 'one of the roles of waterways in nature [was] precisely to sanitise their banks by pulling all putrescible matter far away.'[37] In other words, the function attributed to waterways, i.e. the evacuation of urban excrement, was presented as the main quality of rivers. In conclusion, the committee pointed out that 'the City of Brussels simply [made] use of a natural law by dumping its sewage in the Senne, and that if this [resulted] in a disadvantage in particular for the downstream area, the community, i.e. the province and the government, [was] responsible for dealing with it.'[38]

35. Following these conclusions, the Brussels city council decided in November 1882 – when several private entrepreneurs had approached the city in order to obtain a wastewater concession – to grant industrialists 'the ability to test – at their own expense and with no financial intervention on behalf of the city – wastewater treatment processes.'[39] A private initiative was therefore tasked with testing new processes for the treatment and use of the city's wastewater.

36. A few years later, when the mayor was questioned regarding the advantage of the wastewater treatment experiments carried out in Haeren, he replied that he '[did] not see any obstacles to the continuation of the experiments' because 'if they [were] successful, a big problem [would be] resolved. If not, the city – which [was] not committed – [would not be] risking any danger.'[40]

37. The major project for the treatment and use of wastewater in the capital was delayed and then reduced to the bare bones, before being abandoned. In the end, the emptying of the sewers of Brussels into the Senne – which was first presented as a temporary situation – became a long-lasting solution.

Conclusion

38. What conclusions may be drawn regarding the abandoned project for spreading wastewater from Brussels? How may this be interpreted?

39. A first interpretation would consist in underlining – together with contemporary historiography – the reasons for the decline in practices related to the agricultural use of excrement. Let us bear in mind in particular the importance of the development of new mineral and nitrogenous fertilisers, combined with the impact of Pasteurian discoveries in the area of bacteriology, which confirmed suspicions related to the morbid character of excrement [Hamlin, 2007; Marald, 2002]. Let us also highlight the credence given to the thesis according to which organic waste diluted in water is purified by it [Marald, 2002; Tarr *et al*., 1984]. And let us point out the fact that the 'English system' did not produce the expected financial benefits [Barles, 2005].

40. In Brussels, these elements were certainly the reason why the spreading experiments were abandoned. In particular, the acknowledged impossibility to profit from wastewater was – as we have seen – a key element, which explains why the local authorities gave up on irri-

[35] Ibid., p. 431.

[36] Ibid., p. 414.

[37] Ibidem.

[38] City of Brussels, 1882. Eaux d'égout. Rapport présenté, au nom de la Commission spéciale, par M. le Conseiller Allard. In : *B.C.B*. Session of 1 May, volume 1, p. 415.

[39] City of Brussels, 1882. Proposition de MM. Delpaire et Yeux. In : *B.C.B*. Session of 27 November, volume 2, p. 50.

[40] City of Brussels, 1885. Budget de la Ville pour 1886. Service de nettoyage de la voirie. In : *B.C.B*. Session of 16 November, volume 2, p. 743.

gation techniques and ended up pouring their excrement into the river. But should the abandoned project to spread wastewater from Brussels be considered a failure, illustrating the inability of local authorities to ensure the maintenance of a refuse economy and provide a solution to the problem of polluted water in the Senne?

41. In order to answer this question, another interpretation – which complements the first – may be considered. This second interpretation places emphasis on the role of technical infrastructures in the accomplishment of urban development projects.

42. While the vaulting of the Senne constituted the keystone of the major plan for the sanitisation and enhancement of the image of Brussels, the higher authorities – which were answerable for the interests of the municipalities downstream – placed conditions on these works. The city's promise to implement a system – parallel to the proposed infrastructures for the urban centre – allowing the treatment of wastewater before pouring it into the Senne, allowed it to begin the works diplomatically. Once these infrastructures were built and the mains installed, it would be difficult to turn back. While the wastewater treatment project was still on hold, the Senne 'temporarily' became the outlet for wastewater. In 1882, when the project to spread wastewater was abandoned once and for all, wastewater had been poured into the Senne with no prior treatment for more than ten years.

43. Here, we may refer to the concept of 'momentum' proposed by technology historian Thomas Hughes, who explains how, in time, technical choices solidify in the form of material equipment, economic investments and social habits [Hughes, 1983: 15] which are no longer questioned. Thus, the abandoning of the project to spread wastewater may be considered a political success rather than a technical and economic failure for the city. Brussels succeeded in getting rid of its excrement and all other undesirable matter thrown into the sewer by using the river as an outlet, without any prior treatment. The aim here is not to highlight a form of intentionality on behalf of town councillors, but rather to show how something which was not imaginable in 1866 was able to take shape via the implementation of a major network of technical infrastructures and radically transform the relationship between Brussels and its environment.

44. By abandoning the project to spread its wastewater, the City of Brussels broke once and for all its metabolic tie with the surrounding countryside based on the use of excrement from the city's inhabitants for agricultural purposes. By using the river as a sewer, it also modified on a long-term basis the anthropological impact of Brussels on its aquatic environment.

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