A City and its River During Socialism

The utilisation of the Danube as a source and sink for Budapest 1950-1989

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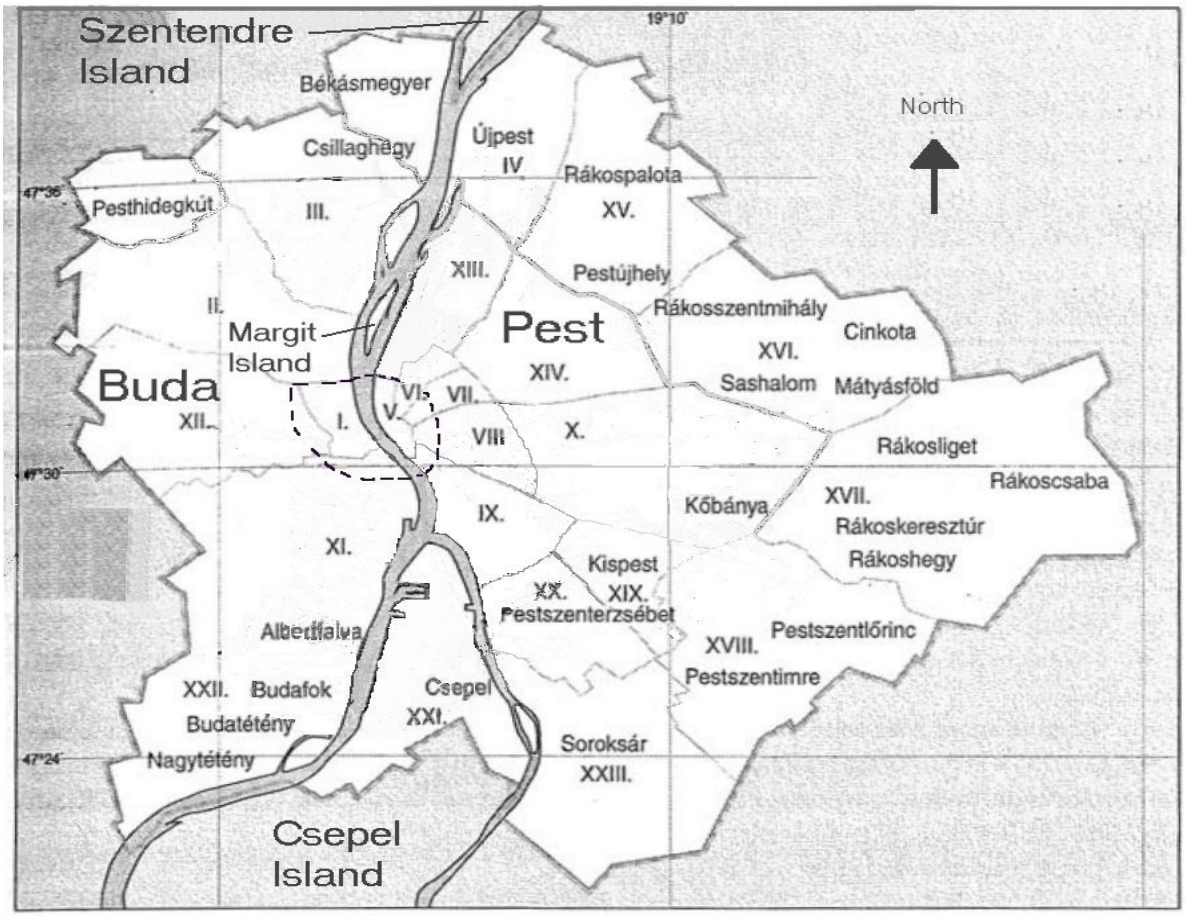

Map 1: Overview (Source: Bajnay, L and G. Kopcsayi (1998) "Az Ipar Fejlödése – Ipari Területek, Ipari Üzemek" in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó, p.33

1.1 Budapest, the Danube and I

This is a story about a city and a river. A city and a river which I have enjoyed as separate and conjoined features of a simultaneously material and social landscape since my regular childhood visits; through boating trips with my family to the islands upstream of Budapest; through crossings of bridges; through riverside breezes on sweltering summer days; and through long walks with my father and later as an adult, with my friends as I have shown them what I consider to be my second home.

As such, having been borne in 1984 and being taken for my first visit to Budapest already the following year, I have in fact, although to a very limited extent,

taken part in what is the subject of this thesis, as a part of, beneficiary and one might even say victim of how the interrelationship between the Budapest and the Danube developed during the final 20 years of the socialist era in Hungary. With this thesis I return to the Danube, to Budapest and their interrelationship in a new manner, as an academic subject, a journey of several years which has given me an entirely new understanding of my second home and what I consider my second, and by far largest urban river, as well as how they have affected each other.

1.2 Budapest as a Danubian City and the Danube as a Urban River

The Danube the valley and floodplains it has formed over the millennia are among the mos defining landscape features of the Budapest area. As the river flows through the city from north to south, it divides the Hungarian Capital in two. On the western bank lies hilly and mountainous Buda, the old city and the historical capital of the Hungarian Monarchy. On the eastern bank lies the Pest-plains, intrinsically related to the Danube, as it is part of the river's ancient floodplain.[1] At Budapest the Danube is a vast and broad typically lowland river, with an average discharge of 190 million m^3 daily.[2]

Going from north to south the river, and later also Budapest's citizens have created several gravelly Islands. These are particularly significant in the context of this thesis, as their gravel layers are the aquifers which since the mid 19th century have been Budapest's main source of drinking-water. In the north is Szentendre Island, primarily rural, which lies at the border between Budapest and surrounding Pest County. In the inner city lies Margit Island, a man made structure dredged together during the regulation of the Danube in the 19th century. In the south lies Csepel Island, the by far largest and also most densely populated and industrialised of the islands in the area.[3]

The panorama view of the Danube and the inner city from the Buda hills is one of the most iconic images of Budapest. However, the stone embankments along the banks on which many of Budapest's significant arcitectural monuments face are not for show. They are a an adaptation to the floods of the Danube. Above and below the

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1 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 11

2 Némedi, Dr. L. (1988) "A Fővárosi Vízgazdálkodás Néhány Környezetegszségügyi Kérdései" *Budapest Közegészségügy*, 20(3), p.73

3 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p.10

inner city these flood defences continue as earthen dikes. While the last flood during the socialist period covered in this thesis to breach Budapest's flood defences was in 1965, the floods continued, and still continue to disrupt life in Budapest. With varying intensity, as often as twice a year, the river inundates the stone embankments of the inner city, halting their use as some of Budapest's main road traffic arteries, which they have been developed into on both banks since the 1960s.

While these aspects of the relationship between the Danube and Budapest are all characteristic, specific to this particular site and a result of Budapest's and Hungary's specific history, this thesis does not revolve around such immediately visible relationships. That is, the reliance of the Hungarian capital on the Danube as both a source of drinking-water and as a sink for wastewater during the socialist era. While the relationships between the river and the city the utilisation of these functions embody are less immediately visible, they are equally, if not more significant.

1.3 The Thesis

The reliance of urban areas and the industries they contain on rivers as sources of drinking-water and as sinks, that is for the neutralisation and removal of wastewaters, has both been a source of significant environmental problems and an important subject in the field environmental history. The provision of sufficient drinking-water and the removal of urban and industrial wastes have been, and arguably still are the most important functions of the aquatic environment in an urban context. The former is a basic necessity of human life and also of industrial production, while without the latter, the health of urban residents suffers. Thus the quantitative and qualitative characteristics of the water resources utilised by cities as sources and sinks can both facilitate and hinder urban and industrial development. However, through the turning of drinking water into wastewater through the process of consumption, cities also affect the aquatic resources they or other settlements are dependent on in mutlifarious and often unpredicted ways.

Budapest's reliance on the Danube for both these basic and at first glance mutually exclusive tasks makes the water resource situation of the Hungarian capital a particularly interesting case. At the dawn of the socialist era in 1947, as a result of how the water supply and drainage had been developed during the period between the

mid 19th and mid 20th centuries, the utilisation of the Danube as a source was not affected negatively by the utilisation of the river as a sink, neither in upstream areas nor locally to any significant extent. However, as a result of the rapid growth of the city and especially its industries during the socialist era, and the significant increases in drinking-water consumption and wastewater discharges this entailed, the initially advantageous situation was deteriorating by 1970.

My overall objective in this thesis is to explore how Budapest' dual dependence on the Danube affected and was affected by the development and growth of Budapest during the socialist era. I have divided this into a series of sub-questions: to what extent the socialist context and form of Budapest's development was responsible for the significant changes in how the source and sink functions of the Danube were utilised; how the socialist regime attempted to manage and prevent the potential for conflict which by 1970 was seen as exiting between these uses of the Danube, and how this relates to the then ongoing process of de-coupling urban and industrial development from aquatic pollution in the developed world; how the socio-political context of Hungarian socialism and the physical and socially constructed characteristics of the resources utilised affected this attempt at environmental management ; and finally how all this affected the socialist development of Budapest

1.4 Main Arguments

The ideologically motivated focus of central socialist decision-makers and planners on modernisation through rapid industrial and urban growth was both facilitated by and affected the utilisation of and the capacity of the Danube as a source and sink for Budapest. By 1970, attempts to resolve significant urban problems had resulted in plans for altering the spatial organisation of the source and sink functions of the Danube utilised by the Hungarian Capital. As a result of concerns voiced by water quality and public health experts over the potential for conflict between the Danube's source and sink functions, plans were drawn up to phase out the utilisation of the river as a sink.

This should be seen in the context of the wider efforts of the socialist regime to incorporate environmental protection into the basic processes of the socialist polity and economy. The plans laid for both urban development were premised on the

assumption that further industrial growth and ongoing economic reforms would improve the capacity of the central government to invest in urban and environmental development.

However, during the 1970s the Hungarian economy entered a crisis form it would never recover. The way the socialist regime handled this economic crisis led to cuts in spending on urban and environmental development and thus had concrete consequences for the implementation of the planned development of Budapest's water management. Despite the failure to implement the planned way of preventing the feared conflict between the source and sink functions utilised by Budapest, the consequences of this were not as negative as had been feared around 1970. To a large extent this was due to the still very advantageous qualitative and quantitative properties of the source and sink functions of the Danube.

1.5 Limitations

While this thesis is primarily concerned with the period between 1970 and 1989, in order to address the issues I wish to cover in this thesis it will also be necessary to go further back in time. In order to discuss the pre socialist basis of Budapest's utilisation of the Danube as a source and sink, it will be necessary to look at the period between the mid 19th and mid 20th centuries when the water supply and sewerage systems on which socialist water managers built further were established. In order to establish what problems faced Budapest as a city in general and in terms of the management of the utilisation of the Danube as a source and sink, it will also be necessary to look at the development of the cityw and its consumption of aquatic resources between 1947 and 1970.

In terms of the issues to be discussed, I will limit myself quite strictly to the perceived potential for conflict between the use of the Danube as a sink and source and the attempts the socialist regime and Budapest's planners and water managers made at managing and preventing these. However, this will also entail looking the development of Budapest in general and how this affected the consumption of the Danube as a source and sink. Moreover, I will also be looking at how the socialist organisation of Hungarian society and the policies and priorities this resulted during this period affected urban development and the management of the environment,

more specifically aquatic resources.

There are several other aspects of the utilisation of the Danube as a source and sink for Budapest the handling of during the socialist era warrants discussion, but which I unfortunately have had to leave outside the scope of this thesis. Some of these will be mentioned in passing, but will not be at the centre of my narrative. These issues include: the influence of upstream utilisation of the Danube as a sink had on Budapest's water management; the effect of the pollutant load discharged at Budapest on the water management of downstream communities along the Danube and on the river as an aquatic ecosystem.

The last subject I find it necessary to justify why I will not cover is the effect of the planned Gabchikovo-Nagymaros Water Barrage System. This was the most internationally renown environmental conflict which emerged in Hungary during the socialist era. It was the foci of some of the first large scale environmental protests in Hungary during the socialist era. The Hungarian part of this joint project with Czechoslovakia was supposed to have been constructed just upstream of Budapest, and it was feared that it would have significant negative consequences for Budapest's water supply. Although even the limited preparatory work which was conducted had significant negative consequences at the wells upstream of Budapest, it does not have any real bearing on the conflict between the conflict between the source and sink functions utilised at Budapest. Moreover, doing this complicated issue justice would require a thesis in itself.

1.6 Sources

The source material for this thesis consists of primary and secondary sources primarily gathered through archival work in Hungary. Predominantly at FSZEK (Fővárosi Szabó Ervin Könyvtár), the central library of Budapest, in its broadly ranging Budapest Collection. However, important sources were also obtained at the National library and at at the library of the Scientific Academy in Budapest. The primary sources consist of plans, articles from scientific journals on urban development, water management and public health, as well as historical works on Budapest's water management and more popular publications.

The primary sources are almost exclusively in Hungarian and I have translated them myself. The initial selection of sources was to a large extent based on availability. The time I had available for archival work in Budapest was limited, and at the time I had limited knowledge about the subject at hand in a Hungarian context. Later, as my my subject has increased, I have narrowed my selection to cover the issues I consider the most central, to a large extent informed by my reading of the secondary literature.

However, there are special circumstances to take into account which have also limited the availability of sources. Hungarian socialism, although a comparatively mild one, was a dictatorship where information and publication of certain types of information was limited. By the period covered in this thesis, the reform socialist period in Hungary, there was little explicit state censorship.[4] However, there were fields, such as environmental issues where the form and content of public statements were limited through self censorship. Moreover, that the circulation of more sensitive data was limited to academic and decision making circles.[5]

The secondary sources can be divided into two main categories. The first consists of scholarly works in both Hungarian and English, primarily sociology, on socialist urban and industrial development, economy and environmental protection. The second consists of scholarly works on urban environmental history, mostly works dealing with the relationship between urban areas and their aquatic environment. The works falling into the first categories I have used both as sources of information on how Hungary and Budapest developed, as well as for constructing my interpretative framework. The works in the second category I have used primarily in this interpretative capacity. The most important aspects of this interpretative framework will be presented below.

1.7 Methods and Perspectives

As this thesis is a work of urban environmental history, the main methods

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4 Skilling, H.G. (1989) *Samizdat and an independent society in Central and Eastern Europe*: Ohio State University Press, p.32

5 Tickle, A. Welsh, I. (1998b) "Ch 7: Environmental politics, civil society and post communism", in (eds) Tickle, A. and Welsh, I, *Environment and Society in Eastern Europe,* Longman, p. 158

applied will be those of the historical-interpretative tradition. This primarily entails applying source criticism and the hermeneutic method of interpretation. I will, as far the quantitative constraints of this thesis make it possible, interpret my sources in relation to their, social, economic, scientific, environmental and ideological context. This interpretative context has to a large extent been derived from the secondary literature on socialist and non socialist urban sociology, sociological works on the Hungarian socialist economy, as well as urban environmental history.

The rest of this introduction will be devoted to presenting my two main interpretative perspectives. The first of these is derived from my reading of the urban environmental history literature on the relationships between cities and their aquatic environment. More specifically, on the use of aquatic media as sources and sinks for urban areas, and how this has developed in the last 150 or so years. My second interpretative perspective concerns socialist urbanisation and the relationship between socialism and the environment. The first part of this is based on my reading of the urban sociology literature on socialist cities, which includes both Hungarian and Western authors. The second is based on my reading of environmental sociology works on the socialist world in general, and on Hungary in particular.

1.8 Perspectives1: Historiography and Ontology

The relationship between cities and rivers has been a significant subject in the academic field of urban environmental history since its institutionalisation began in the 1970s. For the historiographical background for this thesis, as well as the role this will play in my interpretative framework, I have relied on both classical and more recent works published in this field. Representing both North American and European, as well as 19th and 20th century cases.

As environmental historians like M. V. Melosi and M. Cioc have emphasised in ther work, during the period between the mid 19th an early 20th centuries the relationship between cities and their aquatic environment in North America and Europe changed in significant ways.[6] Aquatic media were integrated into urban and industrial infrastructures as sources, but more dramatically, as sinks. This integration

[6] Cioc, M. (2002) *The Rhine : an Eco-Biography, 1815-2000*: Seattle : University of Washington Press
Melosi, M. V. (2008) The Sanitary City : *Environmental Services in Urban America from Colonial Times to the Present*: Pittsburgh, Pa. : the University of Pittsburgh Press

put the intrinsic processes of rivers to work for humanly selected and guided purposes. Seen jointly with the anthropogenic, networked, technical systems through which such integration was effected, using R. White's terminology, rivers, or rather aspects of them became components in organic machines.[7]

Also in Budapest was the Danube's biological and physio-chemical processes, *bank-filtering* and *self-purification*, thus integrated into the urban structure. As I see it, White's concept can be seen as referring to the integration of organic, that is, non-anthropogenic processes into mechanical, that is cultural, anthropogenic systems in order to perform work deemed beneficial by human societies. B. R. Cohen, in his decennial review of White's book, characterises the concept thus: "The point [White's point], in terms of natural and cultural, is not to argue for one over the other but to see their ever-present, always mixed, always entangled relationship."[8]

As Tarr, as well as many other urban environmental historians have emphasised, modern urban water supply and drainage systems were conceived of as solutions to some of the early negative consequences of rapid urban and industrial growth.[9] However, the sink function of aquatic environments in many places came to be dominant. Or as both Cioc and Bendickson have described it, they were "sacrificed" to their function as sinks.[10] In many cases the consequence of such sacrifices was the intense aquatic pollution which persisted into the post WWII era in the developed world, and still persists today in many third world countries.

However, I would argue, as White has in relation to the human constructs putting the Columbia River to work for human ends, that when analysing the utilisation of the intrinsic processes of rivers to neutralise and carry away urban and industrial wastes, seeing this through what Melosi calls the "nature/built environment nexus" does not make sense. In fact, as Melosi emphasises, this nexus obscures many "intriguing questions about city building and city living go untested or

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7 White, R. (1995) *The Organic Machine: The Remaking of the Columbia River*: New York : Hill and Wang

8 Cohen, B. R., (2005) "Escaping the False Binary of Nature and Culture Through Connection", in: *Organization & Environment,* 18 (4): p. 453 *retrieved online from oae.sagepub.com 16.02.2011*

9 Tarr, J. A. (1996) *The search for the ultimate sink : urban pollution in historical perspective*, Akron, Ohio: University of Akron Press, pp. 12-13

10 Bendickson, J. (2007) *The Culture of Flushing: a social and legal history of sewerage*, Vancouver: UBC Press: pp. 326-327
Cioc, M. (2002) *The Rhine : an Eco-Biography, 1815-2000*: Seattle : University of Washington Press: pp. 140-141

unanswered".[11] As I see it, among these are significant material and social relationships between cities and rivers including the focus of this thesis, their function as sources and sinks.

The utilisation of rivers as sinks was based on a body of knowledge and practices which came to be shared by the entire modern world. After initially having been based on the poorly defined concept of dilution, this perceptual basis of utilising rivers as sinks began maturing around the beginning of the 20th century.[12] According to Arn Keeling in his 2005 article *Urban Waste Sinks as a Natural Resource: The Case of the Fraser River*, on liquid waste disposal in 20th century Vancouver, by the early 20th century what he calls "a general theory of stream self purification" had been developed. This was based on the concept of *assimilative capacity* (or, as I will refer to it in this thesis: capacity for self-purification).[13]

Concerns over aquatic pollution in the early to mid 20th century primarily revolved around pathogenic bacteria and the disposal of wasewaters thus primarily with their neutralisation and removal.[14] The former was thought to occur through oxidation and metabolic action, while the latter was assured through the currents of rivers, lakes or oceans. With the development of tests for determining BOD (Biological Oxygen Demand) in the early 20th century the availability of DO (Dissolved Oxygen) for oxidation became measurable. In combination with the theoretical model of oxygen consumption this enabled the quantification of the capacity of bodies of water to act as sinks.[15]

According to Keeling this allowed sanitary engineers to define *assimilative capacity* as a natural resource, and to redefine waste disposal as a rational use of aquatic resources which had to be managed rationally according to scientific principles.[16] This changed the perception of rivers and aquatic pollution. As Keeling

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11 Melosi, M. V. (2010) «Humans, Cities, and Nature: How Do Cities Fit in the Material World?» in: *Journal of Urban History*: (36)3*:* p. 4

12 Keeling, A. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" Urban History Review/Revue d'histoire urbaine 34(1): p. 60

13 Keeling, A. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" Urban History Review/Revue d'histoire urbaine 34(1): p. 60

14 Keeling, A. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" Urban History Review/Revue d'histoire urbaine 34(1):, p. 60

15 Keeling, A. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" Urban History Review/Revue d'histoire urbaine 34(1): p. 60

16 Keeling, A. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" Urban History Review/Revue d'histoire urbaine 34(1): p.61

puts it in relation to his Vancouver case: “waste-disposal engineering turned the Fraser into what historian Richard White calls … an “organic machine”: a natural system deeply interwoven with and transformed by human technological systems.”[17]

This development in how aquatic media functioned as sinks can also be seen in how Hungarian water experts defined the Danube as a sink. From a quantification of the Danube as a sink based on the capacity of its waters to sufficiently dilute wastewaters, by the early socialist period this had been, if not supplanted, then at least supplemented with measurements of DO and BOD. Both in the 1860s and in the late 1940s, and defined on the basis of these two different ways of perceiving the river's capacity as a sink, the Danube was characterised as a high capacity sink, also in the late 1940s capable of dealing with a significantly larger pollutant load than it was.[18]

The period of intense aquatic pollution which lasted until well into the latter half of the 20th century lends itself freely and easily to what Melosi has derided as the declensionist narrative, the portrayal of urban and industrial development as inevitably leading to environmental degradation.[19] However, this period is not the primary subject of this thesis. During the latter half of the 20th century, which is the period which I will focus on, the relationship between cities and rivers changed much. These changes were to a large extent responses to the material consequences of the use of rivers as sinks, pollution and the risks it was increasingly recognised as representing to human and non-human lives.

However the material changes in the relationship between cities and rivers during the latter half of the 20th century were nonetheless to a large extent a result of changes in how rivers and their uses were perceived. Or in other words, how they were constructed socially. As Keeling emphasises in his article, the fact that we today in the developed world for the most part can enjoy relatively clean rivers, lakes and coastal water is to a large extent a result of changes in the perception of rivers as sinks and the effort in terms of pollution abatement this led to.[20]

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17 Keeling, A. (2005) “Urban Waste Sinks as a Natural Resource: The Case of the Fraser River” Urban History Review/Revue d'histoire urbaine 34(1): p.59

18 Garami, T. et al. (1972) *Pest Város 1847. évi csatornázási szabályrendeletének 125 éves évfordulója*, Budapest: Mezőgazdasági Könyvkiadó: p. 374

19 Melosi, M. V. (2010) «Humans, Cities, and Nature: How Do Cities Fit in the Material World?» in: *Journal of Urban History*: (36)3*:* p.6

20 Keeling, A. (2005) “Urban Waste Sinks as a Natural Resource: The Case of the Fraser River” Urban History Review/Revue d'histoire urbaine 34(1): pp. 65-66

Perhaps the most significant consequence for the relationship between cities and aquatic environments of t his redefinition was that the rationality of using rivers to neutralise urban and industrial wastes came to be questioned. However, the process of phasing out the utilisation of rivers as sinks took a long time. As Bendickson has emphasised this was a joint result of the high cost of pollution abatement technologies and of how entrenched the perception of the rationality of utilising rivers as a sink was.[21] This process of redefining the rationality of utilising aquatic media as sinks, as well as the work of build treatment works in order to phase it out, were among the central processes going on in Budapest's water management from the 1970s to 1989.

1.9 Perspectives 2: Socialist Cities and Socialist Environments

Many historical accounts been have written about the relationship between cities and rivers, have changed as the cities have grown and been developed.[22] However, in most cases the cities and rivers in question have been in what was called the First world or the West. That is, North American and Western European cities, the development of which happened in the context of what, for the sake of generalisation, one might call capitalistic and democratic socio-economic systems. While of course influenced by specific local, regional and national circumstances, this socio-economic and decision-making context has had significant influence for how cities in these parts of the world have developed, and thus also on their relationship with more or less urban(ised) rivers.

Between 1970 and 1989 Budapest and its relationship with the Danube, the subject of this thesis, developed under the influence of a different socio-economic system: that of Marxist socialism. Thus, an important overarching line of inquiry in this thesis is whether, and if yes, how the socialist socio-economic context resulted in a particularly socialist relationship between Budapest and the Danube. Or to be more

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[21] Bendickson, J. (2007) *The Culture of Flushing: a social and legal history of sewerage*, Vancouver: UBC Press: p.327

[22] Tarr, J. A. (1996) The search for the ultimate sink : urban pollution in historical perspective, Akron, Ohio: University of Akron Press
Bendickson, J. (2007) *The Culture of Flushing: a social and legal history of sewerage*, Vancouver: UBC Press
Porter, D: H. (1997) *The Thames embankment : environment, technology, and society in Victorian London,* Akron, Ohio : University of Akron Press
Halliday, S. (1999)*The Great stink of London : Sir Joseph Bazalgette and the cleansing of the Victorian capital*: Phoenix Mill [England] : Sutton Publishing

precise, whether or not socialist urban development and environmental management resulted in significant differences in how the Danube was utilised as a source and sink for Budapest, and how the emerging conflicts between these were managed.

As I see it, this represents three distinct, but intrinsically interlinked lines of inquiry: whether or not the socialist system in Hungary resulted cities which were significantly different from those developed in capitalist countries; whether or not socialism in Hungary resulted in a distinct relationship between society and the environment; and finally whether or not these two preceding factors, jointly or separately, thus resulted in a particularly socialist relationship between Budapest and the Danube's source and sink functions.

1.10 Socialism

Socialism as a socio-economic order and ideological system has in both popular media and academic publications been presented as resulting in urban and environmental outcomes which differ in significant ways from those of societies under capitalist socio-economic orders. However, just as there are many different models of capitalist societies and that these change over time, this is also the case with socialism in ECE (Eastern and Central Europe). As Zs. Gille has emphasised in her book on waste and waste management in Hungary, *From the Cult of Waste to the Trash Heap of History: The Politics of Waste in Socialist and Postsocialist Hungary,* socialism was not in general in ECE, nor in Hungary, a constant.[23] Both in terms of its overall functioning as a political and economic system, as well as its concrete economic, urban and environmental policies, Hungarian socialism was dynamic, the regime sought to respond and adapt to new conditions, pressures, needs and problems.

As Gille describes it, socialism in ECE is usually divided into two broad periods: a Stalinist period, which with its rigidly planned command economy and overriding focus on industrialisation is what in the West is usually identified with socialism in general; and a post Stalinist, or reform-socialist period. It is this latter period, which in Hungary began after the 1956 uprising, which will be the main focus in this thesis. The reforms of the Kádár regime, which took power after 1956,

[23] Gille, Zs. (2007) *From the Cult of Waste to the Trash Heap of History: The Politics of Waste in Socialist and Postsocialist Hungary,* Bloomington: Indiana University Press, p. 7

changed the way the economy worked, focused on consumption and the improvement of the living standard, and eventually also extended to significant environmental reforms.[24]

1.11 Socialist Cities

The question of whether or not socialism in ECE in general and Hungary in particular resulted in in distinctively socialist material and social relationships between cities and their bio-physical setting, their environment, is an issue on which I have not been able to find much up to date literature. As Zs. Gille emphasises in her book, environmental scholarship on the socialist era has been limited, both in terms of volume and the application of relevant theoretical perspectives.[25] While, as Gille also points out, more up to date works have been published during the last years, I have either not had access to this body of literature, or it has not been irrelevant for my case as they mostly deal with the post-socialist period or with other socialist countries.

The scholarship regarding socialist cities, on the other hand, has been expansive and often at the leading edge of the field of urban sociology. The question of whether or not socialism resulted in cities which were significantly different from their capitalist counterparts was a subject of academic dispute during, as well as after the socialist period in the region. According to I. Szelényi, in his contribution to *Cities After Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies*, an anthology which deals extensively with the question at hand, the academic dispute was characterised by the divisions within urban sociology. As Szelényi portrays it, the two primary traditions of urban sociology, the ecological and historical, due to their different analytical emphasis arrived at conflicting interpretations of the empirical material.[26]

Szelényi and another contributor to *Cities After Socialism*, G. Enyédi, are both

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[24] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 215 and
Gille, Zs. (2007) *From the Cult of Waste to the Trash Heap of History: The Politics of Waste in Socialist and Postsocialist Hungary,* Bloomington: Indiana University Press, pp. 7-8

[25] Gille, Zs. (2007) *From the Cult of Waste to the Trash Heap of History: The Politics of Waste in Socialist and Postsocialist Hungary,* Bloomington: Indiana University Press: p. 12

[26] Szelényi, I. (1996): "Cities Under Socialism – and After" in G. Andrusz, M. Harloe and I. Szelényi*: Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p.288

among the most prominent Hungarian sociologists of the socialist and post-socialist era. In this anthology they each represent on of these opposite sides in the academic dispute over the significance of the socialist socio-economic order for the way in which ECE cities developed after the Second World War. As I see it, the starting point of this discussion is that the socialist context of urban development in ECE was at the same time very different and very similar to its counterparts in capitalist countries.

On the one hand the overall, often ideologically determined aims, the centralised decision-making structure, as well as the methodological and economic means utilised in order to attain these goals through the implementation of the decisions made were distinctly different.[27] On the other, the technologies applied and the functions these were meant to perform, as well as the overall context of modern, industrialised society and the orientation towards growth, were quite similar to what characterised urban development in the West.[28]

The historical school, which Szelényi represents in this discussion, emphasising the former in their analysis arrive at the conclusion that there were significant differences.[29] The ecological school, on the other hand, represented here by Enyédi, emphasising the significance of the latter, arrive at the conclusion that while there were differences, these were only temporary. Moreover, that due to the determinant influence of industrial technology, cities in ECE over time exhibited a tendency towards convergence with what Enyédi calls a "generally applicable global process of urbanisation".[30]

As Enyédi emphasises in a collaboration with V. Szirmai specifically on Budapest, "(u)rban planners gained an unprecedented opportunity to interfere in the

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[27] Smith, D. A. "The Socialist City" in in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p.77 and
Szelényi, I. (1996): "Cities Under Socialism – and After" in G. Andrusz, M. Harloe and I. Szelényi*: Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p.287

[28] Enyédi, G. (1996)"Urbanization Under Socialism*",* in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. pp. 104-105

[29] Szelényi, I. (1996): "Cities Under Socialism – and After" in G. Andrusz, M. Harloe and I. Szelényi*: Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p.287

[30] Enyédi, G. (1996)"Urbanization Under Socialism"*,* in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. pp. 102-103

spatial structure of towns and cities".[31] Despite this, as both historical and ecological scholars agree on, for reasons which I in Budapest's case will discuss in this thesis, the process of urban development itself did not function according to socialist principles. That is, centrally directed and funded urban planning was not able to direct the process of urbanisation to attain concrete goals and socialist ideals.[32] Moreover, another aspect they agree on, is that as a result of this socialist urban did not result in cities which "looked socialist".[33] Finally, despite the above, both Szelényi and Enyédi point to distinct urban structures and forms which developed in ECE cities during the socialist era that differed from what normally found in capitalist countries.[34]

Despite this significant common ground, Szelényi and Enyédi arrive at divergent conclusions, as I see it, to a large extent due to the different analytical perspectives they employ.Szelényi, who emphasises the differences, argues as follows: "these were not socialist cities because they looked socialist, as defined by the visions of planners and ideologues, but because they were cities in an industrial society which had abolished private ownership of the means of production."[35] Enyédi, on the other hand, bases much of his argument on the failure of urban development in ECE to follow the plans drawn up, as well as the fact that this entailed that the cities built did not confirm to socialist ideals.[36]

In the context of this thesis, both these perspectives are significant. While the theoretical dispute is not very relevant to my subject, the point remains that socialist cities, Budapest among them, developed in distinct ways as a result of the socialist

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31 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 144.

32 Szelényi, I. (1996): "Cities Under Socialism – and After" in G. Andrusz, M. Harloe and I. Szelényi*: Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p.287

33 Szelényi, I. (1996): "Cities Under Socialism – and After" in G. Andrusz, M. Harloe and I. Szelényi*: Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p.287

34 Enyédi, G. (1996)"Urbanization Under Socialism"*,* in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p. 103, 105, 115
French, R. A. and F. E. I. Hamilton (1979) "Is There a Socialist City?" in: R. A. French, and F. E. I. Hamilton (ed) *The Socialist city : spatial structure and urban policy*, New York: Wiley, p.15
Szelényi, I. (1996): "Cities Under Socialism – and After" in G. Andrusz, M. Harloe and I. Szelényi*: Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p. 287, 303 and 305

35 Szelényi, I. (1996): "Cities Under Socialism – and After" in G. Andrusz, M. Harloe and I. Szelényi*: Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p.287

36 Enyédi, G. (1996)"Urbanization Under Socialism"*,* in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p. 104 and 110

socio-political context in which this process happened. However, equally significant is the fact that there were similarities, and that many of these were a result of the modern character of the industrial and urban technologies employed.

1.12 Socialist Urban Environments

One of my original reasons for wanting to write my masters thesis on a Hungarian subject from the socialist era was the common conception of socialism as in itself as causing environmental damage. According to Gille, through media representations and scholarly work, this image of socialism became widespread in the west during and after the socialist era. As Tickle and Welsh put it "(t)he western media's identification of intense pockets of environmental degradation was taken as proof that communism held the environment in complete disregard..."[37]

Socialism's environmental failings were usually ascribed to a series of factors perceived to be inherent to the socialist socio-economic order: that the inefficiency of state ownership and lack of market prices led to inefficiency and waste; the labour theory of value, the Marxian concept due to which in socialist countries labour was supposedly perceived as the only source of value and that natural resources were thus treated as free and inexhaustible; and that due to state ownership, polluters and regulators had "an identity of interest", due to which pollution was allowed to continue.[38] However, as Gille emphasises, in most cases such statements of how and why socialism affected the environment negatively were not based on empirical work.[39]

Building further on Enyédi's emphasis on the significance of the shared context of modernity and of the similarity of urban and industrial technologies for the character of urban development, I would argue that this is also significant for the relationship between socialist cities and their environment. Urban environmental problems both in West and East were to a large extent the result of industrial technologies, urban technological networks, as well as the concentration of people

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[37] Tickle, A. and I. Welsh (1998) "Ch 1: The 1989 Revolutions and Environmental Politics in Central and Eastern Europe", in A. Tickle and I. Welsh (eds) *Environment and Society in Eastern Europe,* Longman: p. 3

[38] Gille, Zs. (2007) *From the Cult of Waste to the Trash Heap of History: The Politics of Waste in Socialist and Postsocialist Hungary,* Bloomington: Indiana University Press: pp. 2-3 and p. 12

[39] Gille, Zs. (2007) *From the Cult of Waste to the Trash Heap of History: The Politics of Waste in Socialist and Postsocialist Hungary,* Bloomington: Indiana University Press: pp. 2-3 and p. 11

and industries that urban areas engender.

Moreover, as I will explore in my empirical chapters, modern scientific and engineering perspectives, which to a large extent were shared by both socialist and capitalist systems, were similarly central for defining how the environment environmental problems and environmental management was perceived. As Tickle and Welsh argue, an "important similarity between both liberal and socialist systems was the belief that "Nature" could be made subordinate to human will through science and technology".[40] As I will illustrate in my empirical chapters, this is highly relevant for the way in which the Kádár regime attempted to manage the relationship between the sink and source functions of the Danube utilised by Budapest.

However, there were also significant differences. While, as Gille has argued, ascribing these differences to macro-economic and philosophical principles such as the labour theory of value is simplistic, inaccurate and based on "...outdated political science and economic approaches to state socialism..."[41] Moreover, as my discussion of the environmental management in Hungary will demonstrate, socialist regimes were indeed concerned about environmental issues and attempted to resolve and prevent these. Although in many respects similar to environmental legislation and regulations being implemented in the west, the socialist socio-economic context had real effects on the form and success of measures.

In terms of form, when environmental issues entered the political agenda in the late 1960s, the possibilities offered by planning and central control over decision-making were according to Enyédi seen as enabling.[42] The environmental project of the Kádár regime during the 1970s and 1980s was a greening of Hungarian socialism through the integration of environmental considerations into the basic processes of the socialist polity and economy.[43] Planning as the basis of the socialist economy was to aid an emphasis on rational, long term, preventive approaches and the management

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40 Tickle, A. and I. Welsh (1998) "Ch 1: The 1989 Revolutions and Environmental Politics in Central and Eastern Europe", in A. Tickle and I. Welsh (eds) *Environment and Society in Eastern Europe,* Longman: p. 10

41 Gille, Zs. (2007) *From the Cult of Waste to the Trash Heap of History: The Politics of Waste in Socialist and Postsocialist Hungary,* Bloomington: Indiana University Press: pp. 2-3 and 12

42 Enyédi, G. (1974) "Chp 7: Planning for the Purposeful Use of the Environment: A Hungarian Viewpoint" in: I. Völgyes (ed) *Environmental Deterioration in the Soviet Union and in Eastern Europe,* New York: Praeger Publishers: p. 125

43 Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham, p. 220

and conservation of natural resources, as well as ensuring healthy, high quality environments for Hungarians were priority areas.[44]

While the socialist regime thus made efforts to protect the environment, the fact remains that just as in other socialist countries there were significant environmental problems. At one level, these problems were the result of modernisation, and in many respects similar to the ones capitalist countries were still in many cases suffering from. However, the failure to resolve these problems through legislative, regulatory and institutional means was in many cases due to the function, or rather dysfunction of the socialist socio-economic system in Hungary. While not as directly and simply as the applications which Gille has critiqued in her book would have it, inefficiency, centralised control over the economy and the influence this gave industrial actors in decision-making processes were among the most common causes for the failure of environmental regulation and development.

1.13 Thesis Outline

This thesis will be divided into three empirical chapters, which will then be followed by a conclusion. Chapter two will in many ways serve as a basis for the rest of the thesis. In it I will first discuss the conceptual and material basis of Budapest's water management regime, as laid down in the pre-socialist era. I will then move on to discuss the two first decades of socialist urban development in Budapest and the initiation and structures of socialist urban planning for Budapest. I will then move on to discuss how socialist urban planning and development affected the utilisation of the Danube as a source and sink in this period, how water management plans developed, and how the changes in water management deemed necessary to facilitate the plans for urban and industrial development foreshadowed later problems.

Chapter 3 will deal with the ambitious plans drawn up during the period of optimism around 1970, and how plans for continued modernisation of the Hungarian capital was seen as necessitating significant changes in the city's water management regime. I will also analyse in detail how drinking water production through bank-filtering was coming to be seen as exposed to mounting risks, as well as how the Danube was perceived as a sink. Moreover, how changes in how these two functions

[44] Enyédi, G. (1974) "Chp 7: Planning for the Purposeful Use of the Environment: A Hungarian Viewpoint" in: I. Völgyes (ed) *Environmental Deterioration in the Soviet Union and in Eastern Europe,* New York: Praeger Publishers: p. 125

of the Danube were perceived as interlinked, and came to be seen as potentially conflicting. Finally I will discuss the emergence of coherent environmental protection measures in Hungary, and how the plans for preventing the conflict between the Danube's source and sink functions through wastewater treatment fitted into this context.

In part 1 and 2 of chapter four I will examine how Hungary's economic difficulties affected the implementation of the plans for urban development, as well as the planned greening of Hungarian socialism in the 1970s and 1980s, as well as the level of ambition of new plans being drawn during this period. This will be followed by a brief interlude, part 3, on the changing focus in the West in terms of risk perception in relation to drinking water during the 1960s and 1970s, and how this changed how the utilisation of aquatic media as sinks was perceived. Parts 4 and 5 will deal with how the economic crisis, declining investments, the development of Budapest as well as the new perceptions of risks in relation to aquatic media affected the planned development of of the Danube as a source and sink respectively. Finally, in part 6, I will look at how the perceived potential for conflict between water production through bank-filtering and wastewater disposal through self-purification changed from impending to resolved and back to chronic dyring the 1970s and 1980s. I will then round of with chapter 5, a tentative conclusion, in which I will adress my research questions more discretely.

2 Chapter 2

In 1947, at the dawn of the socialist era in Hungary, Budapest was blessed, one might say, with a very advantageous situation in terms of water resource endowments. This was the result of how urban developers during the period between the mid 19th and first half of the 20th century had taken advantage of the intrinsic properties of the Danube and the landscape it had created around what became the Hungarian Capital. Through the infrastructural systems developed, these properties were integrated into the urban structure as the active components in biological machines producing drinking-water and removing and neutralising pollutants. By keeping the source and sink functions of the river thus integrated more or less spatially distinct, and due to the very favourable qualities of the Danube as a source and sink, Budapest avoided

many of the problems related to aquatic pollution experienced by similarly situated cities during the period from the late 19th to the mid 20th century.

The initial period of socialist urban development in Budapest was characterised by a lack of planning, and ad-hoc solutions. This was to a large extent due to an almost single minded focus on industrial development. Essential urban infrastructures such as housing and transport, as well as those in focus in this thesis, water supply and sewerage, were not a priority. Due to the combination of this low priority and the rapidity of the growth, significant shortages, imbalances and other problems were allowed to reach critical levels. The advantageous water resource situation of Budapest was an important premise for concentrating industrial development in Budapest.

The 1960 ÁRT, the first master plan for Budapest was drawn up with the intention of remoulding Budapest into a socialist city. It was at the same time a response to the problems springing from the low priority which had been assigned to infrastructural development in the 1950s. This also extended to the development of the source and sink functions of the Danube utilised by Budapest. In addition to addressing the shortages which had developed as a result of the neglect in the 1950s, these plans, as the ÁRT, took a long term approach, intending to stay ahead of demand. However, despite the thoroughly elaborated plans, due to economic difficulties and continued emphasis on extensive industrial development, implementation of the 1960 ÁRT was patchy at best.

The long term water supply and sewerage plans were not limited to the development of the supply and drainage networks. They also addressed the long term development and management of Budapest's water resources. Aside from an ad-hoc resort to surface water treatment to rapidly address the lag in water production development, it was decided that Budapest's water supply would also in the future be based on the organic machine of bank-filtering. However, already by 1960 it was evident that in the long term changes in the spatial organisation of water management would might bring the future water needs of the city into conflict with its reliance on the river for pollutant neutralisation. In preparation for this, as well as in response to the rapid deterioration of surface water quality during the 1950s, the full biological treatment of Budapest's wastewaters was declared as a long term goal.

This chapter is divided into three parts. In the first I will look at the development, advantages and principles underlying Budapest's advantageous pre-socialist water management regime. In the second I will look at the progress from unplanned to planned socialist development of Budapest, the problems the former resulted in and how the latter aimed to resolve them. Moreover, I will also look at the context of urban planning and development in socialist Hungary, in terms of its decision-making structures, its inspirations and its sources of funding. The third part will be devoted to how Budapest's utilisation of the Danube as source and sink developed. First the problems which arose in the 1950s and then the plans for resolving these drawn up in 1960.

2.1 Establishing the "Organic Machine": The Development of the Danube as a Source and Sink for Budapest in the First Half of the 20th century

Budapest's water supply and wastewater disposal systems were during the period from the mid 19th and mid 20th century developed in tune with the paradigm of sanitary engineering, which in the developed world dictated how such issues were to be resolved until after WWII. Through the form and spatial configuration of the infrastructural systems built around 1900, the Hungarian capital was able to capitalise on its advantageous water resource endowments. Together with the intrinsic properties of the Danube, the water management paradigm which emerged by the early 20th century, ensured that Budapest avoided the drinking water quality problems and gross degradation of the aquatic environment which many growing and industrialising cities in the 19th and 20th centuries experienced.

In this part of my thesis I will go back to investigate these conceptual and structural roots of Budapest's utilisation of the Danube as source and sink, and the basis this established for the development of the Hungarian capital under the auspices of the socialist regime after World War II. Such concepts and structures are tightly interrelated and intermeshed. Moreover, urban infrastructures like water-supply and sewerage networks are both very expensive and long lasting. They are, as Joel Tarr described it in his discussion of sewerage technologies in the US, very path dependent technologies.[45]

[45] Tarr, J.A. (2004) "Pittsburgh Wastewater Issues: The Historical Origins of anEnvironmental Problem" Paper

Taking this into account, the structures laid down in the first half of the 20th century and the conceptual perceptions of the river underlying them had a very significant influence on the utilisation of the Danube as a sink and source during the socialist era. As I will explore in the following, during the early 20th century, processes intrinsic to the Danube came to be integrated into Budapest's urban structure. In fact, life, health and industrial progress in Budapest became dependent on the advantageous water resource situation which the integration of the Danube into the urban structure ensured. These advantages persisted into the socialist era, and how these were still the basis of Budapest's water supply and wastewater disposal will be discussed in the final part of this chapter.

As the only significant body of water in the Budapest region, the Danube was put in to service as both source and sink for the Hungarian capital towards the end of the 19th century. While the Danube facilitated many other water uses in Budapest during the 19th and 20th century, its role as source and sink and the gradually intensifying conflict between these water uses were determinant for the city's water management policies, especially after WWII.

Budapest's position on the Danube entailed several important advantages. In terms of drinking water resources, the Budapest region contains one of Europe's longest stretches of *bank-filtered aquifers.*[46] These are alluvial gravel deposits, into which water from the parent-river seeps. During this journey's 10-90 days' duration, most of the pollutants in the raw river water are removed through "... a complex biological and physiochemical slow-filtering process."[47] From the establishment of the first modern waterworks in 1843, wells sunk into these aquifers have been the by far most significant source of water, at least for household consumption.[48]

Budapest's location was also very advantageous in terms of the river's capacity as a sink. As such things were understood until after WWII, the Danube had a very high capacity as a sink, that is *for self-purification* (a concept I will discuss in more

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presented at the 6th International Summer Academy on Technology Studies: Urban Infrastructure in Transition: What can we learn from history?, Deutchlandberg, Austria, 11.-17. July: p.380

46 Némedi, Dr. L. (1988) "A Fövárosi Vízgazdálkodás Néhány Környezetegszségügyi Kérdései" *Budapest Közegészségügy*, 20(3): p.74

47 Némedi, Dr. L. et al. (1991) "A Partiszürésü Kutak Vízminösége Budapest Térségében a Tervezet Nagymarosi Erömü Épitése Elötti Években (1986-1990)", in: *Budapest Közegészségügy*, 23(2): p.38

48 Csernyászki, L. and Cs. Várzegi (1993) "A Fövárosi Vízmüvek Víztermelö Rendszerének Kialakitása, Üzemeltetése" *Hidrologiai Közlöny*, 73(3): p.133

detail below): both in terms of its vast volumes of water with which to dilute and otherwise neutralise effluents or its swift current to carry them away. Furthermore, despite Budapest's midstream position, due to the relative distance to significant upstream pollution sources, the Danube arrived at Budapest with quite a high content of DO (Dissolved Oxygen). This was the water quality parameter which with the professionalisation of sanitary engineering around 1900 came to be seen as decisive for the decomposition of pollutants, either through oxidation or the work of bacteria.

2.1.1 Budapest's Water Management in the First Half of the 20th Century

The way water supply and sewerage infrastructures were developed in Budapest from their introduction until World War II did much to take advantage of and preserve Budapest's advantageous situation on the Danube in terms of water resources. The development of cities and also urban water supply and drainage systems during the late 19th and early 20th centuries was conducted on the basis of a quite broadly shared engineering and technical basis. This was most certainly the case in the industrialised countries of North America and Europe. As I have argued in my introduction,Budapest's water supply and drainage systems were developed with inputs from engineers from other European countries, and were based on the same discourse of hygiene, drinking water quality and self-purification as in the UK, the US and Germany.

Despite its midstream position on the Danube and the fact that it utilised the river as both source and sink, the Hungarian capital experienced very few water quality problems prior to WWII. As Csernyászki and Várszegi of the FVM pointed out in 1993, looking back at the 125 year history of bank-filtered drinking water abstraction; "... (A) significant majority of the produced water has through 110 years not required treatment."[49] Neither upstream nor local wastewater discharges had any significant impact on drinking water quality. In light of the concerns over the use of the Danube as both sink and source at Csepel, I would argue that in terms of local efforts, the lack of serious concern over water quality problems until after WWII was to a large extent due to the at least partially successful efforts to restrict source and

[49] Csernyászki, L. and Cs. Várzegi (1993) "A Fövárosi Vízmüvek Víztermelö Rendszerének Kialakitása, Üzemeltetése" *Hidrologiai Közlöny*, 73(3): p.133

sink uses to distinct sections of the Danube.

This spatial separation of the Danube as a source and sink was achieved through the way the infrastructural systems mediating between the city and river were developed. The first waterworks established in 1866 were based on the utilisation of aquifers in the inner city. However, by the early 19th century, when the first wells were sunk at Szentendre Island upstream of Budapest the aquifers in this area swiftly became the most important for Budapest's water supply.[50] This ensured that only upstream pollution sources could affect the main basis of Budapest's water supply. However, any significant pollution in the Szentendre area was prevented by the fact that it is situated sufficiently far downstream of any significant upstream pollutant sources for most polluting effects to have dissipated by the time the Danube reaches the wells. At least in terms of pollution levels which could affect the quality of bank-filtered waters at Szentendre negatively.[51]

By the 1890s, after many years of planning, the construction of Budapest's drainage system was also initiated. The system was based on plans drawn up by among others J. Bazalgette, the engineer responsible for London's main drainage. Conceptually similar to the one Bazalgette had already implemented in London, the plan was based on the construction of intercepting sewers along both banks of the river, which would discharge the collected wastewater through high pressure conduits into the Danube's main current below the city.[52] While perhaps not primarily in order to protect the aquifers of the inner city, according to M. Szilágyi: «... ending the pollution of the Danube-banks in the capital (is) a basic premise of the entire concept.»[53]

Although only the Pest bank intercepting sewer was completed prior to WWII, the fact remains that the intention was to discharge wastes below the city, and a significant ratio of Pest's wastewaters were actually discharged as planned.[54] However, by the 1930s, in response to the outward growth of the city on the Pest side,

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[50] Budapest Technical University, Department of Water and Waste-water Engineering, (ed) Wisnovszky, I,: *Integrated Water Resource Management of Budapest and the Surrounding Areas*, Római Kiadó és Nymodaipar, Budapest, 1993 p. 29 and Csernyászki, L. and Cs. Várzegi (1993) "A Fövárosi Vízmüvek Víztermelö Rendszerének Kialakitása, Üzemeltetése" *Hidrologiai Közlöny*, 73(3): p. 133

[51] Csernyászki, L. and Cs. Várzegi (1993) "A Fövárosi Vízmüvek Víztermelö Rendszerének Kialakitása, Üzemeltetése" *Hidrologiai Közlöny*, 73(3): p.133

[52] Szilágyi, M. (1967) "A Föváros és Csatornamüvének Fejlesztése" *Hidrologiai Közlöny,* 47(6): pp. 314-316

[53] Szilágyi, M. (1967) "A Föváros és Csatornamüvének Fejlesztése" *Hidrologiai Közlöny,* 47(6): p. 313

[54] Szilágyi, M. (1967) "A Föváros és Csatornamüvének Fejlesztése" *Hidrologiai Közlöny,* 47(6): pp. 314-316

new intercepting sewers were built to drain the growing northern and eastern suburbs. The waste waters collected in these were discharged at Angyalföld, a northern suburb upstream of the city centre.[55]

The consequent increased discharge of wastewater in the inner city prompted the decision to introduce new sewerage regulations in 1927, which made primary treatment mandatory before discharge.[56] As Rácz et. al. state in their 1976 article on the Hungarian capital's sewerage and waste-water treatment: "... already in the 1930s the advantage of discharging waste-waters into the Danube was reversed, and treatment became a prerequisite of such discharges."[57] By the end of the 1930s plans were also being drawn up for the construction of a new treatment plant at Angyalföld as well as one along the Ráckeve branch of the Danube. According to comments dating from after WWII, the former was seen as necessary in order to protect the aquifers at Margit Island.[58]

Thus, as Budapest as well as its consumption of water and discharges of wastewater grew during the first half of the 20th century, the Hungarian capital's water resource situation remained very advantageous. This was to a large extent a result of the integration of the Danube's physical, chemical, hydrological and biological processes into the urban structure as the central components of organic machines. However, the spatial and functional configuration of the infrastructural systems mediating between city and river, and the way in which they, to a significant extent, separated the two potentially competitive uses, was also very significant.

Budapest and its industries thus had access to copious, high-quality drinking water at a low cost despite its midstream situation along the Danube. Seen as a natural resource and integrated as the active component of the growing Hungarian capital's wastewater drainage and disposal network, the river's great capacity for self-purification enabled the increasing volumes of household and industrial wastewater generated to be discharged without the added cost of treatment. Thus, the postponeability of sewerage investments, as J. Bendickson and J. A. Tarr have argued

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55 Szilágyi, M. (1967) "A Főváros és Csatornamüvének Fejlesztése" *Hidrologiai Közlöny,* 47(6): p. 316

56 Szilágyi, M. (1967) "A Főváros és Csatornamüvének Fejlesztése" *Hidrologiai Közlöny,* 47(6): p.316

57 Rácz, T. et al. (1976)"A Budapesti Szennyvízelvezetési és Tisztitási Program Megvalósulása" *Hidrologiai Közlöny*, 56 (5): p.190

58 Garami, T. et al. (1972) *Pest Város 1847. évi Csatornázási Szabályrendeletének 125 éves Évfordulója*, Budapest: Mezőgazdasági Könyvkiadó, pp. 59-61

for as a recognisable factor in modern urban development, did not affect Budapest, the Danube or the downstream users of the Danube as negatively as it did cities in similar situations in Europe or North America.[59]

However, already by the 1930s the rapid growth of the city and lack of funds led to divergence from the principles laid down around 1900. In short order this caused problems with surface water quality in the inner city as well as concerns over the quality of drinking water drawn from the section of the river now utilised as both source and sink. Although no significant decline in water quality was registered, concern over this dual use continued well into the socialist era, and I would argue the cause of this was the bacterial orientation of the hygienic paradigm of sanitary engineering. As I see it this was also what motivated the conceptual principle of separating sink and source uses in the first place.

This advantageous access to water resources persisted into the socialist era. However, the rapid and initially unplanned development of Budapest, with emphasis on industrial development which the Hungarian socialist regime initiated immediately after the war, which will be discussed in the next part of this thesis, further widened the cracks in the conceptual basis of Budapest water management which had emerged in the 1930s.The concern over the possible negative impacts which local wastewater discharges might have on the quality of bank-filtered water in the 1930s thus foreshadowed issues which would dominate water-management in Budapest in the postwar era. So would the gap between well thought out plans and their actual implementation, as in the 1930s ascribable to the dearth of funding for water management.

2.2 The Problems of Socialist Urban Development

Like I indicated in the introductory chapter of this thesis, many of the relationships between the Danube and Budapest were both subjects of urban planning and development in their own right during the socialist era, as well as being influenced by how other aspects of Budapest were developed. The clearest example

[59] Bendickson, J. (2007) *The Culture of Flushing: a social and legal history of sewerage*, Vancouver: UBC Press: pp. 295-296
Tarr, J. A. (1996) *The search for the ultimate sink : urban pollution in historical perspective*, Akron, Ohio: University of Akron Press: p. 13

of this is perhaps the subject of this thesis, the Danube's functions as a sink and source for Budapest and the consumption of the Danube as such. The planning and development of these functions of the Danube, as well as the important interrelationship between them, will be discussed later in this chapter, as well as in the two remaining empirical chapters.

For now I will focus on the wider context of urban development in Budapest during the socialist era. This is significant on two levels. First of all, the development of water management infrastructures were only one item among many on the agenda of planners and other decision-makers. Thus, they competed with other significant issues and problems for priority and funding through the processes of planning and implementation. Secondly, an essential factor for explaining changes in the consumption of the Danube as a source and sink can is how the city's water consuming and wastewater producing functions were developed. In other words, understanding the urban development agenda in general is essential for understanding the place held by water supply and sewerage infrastructures, as well as why and how the consumption of the Danube as a source and sink grew.

In this section I will start by looking at how the issues and problems which urban planning revolved around in the 1970s and 1980s emerged. I will then move on to look at how detailed urban planning based on socialist principles was initiated as a response to these issues, and examine the position of the process of urban planning and development in the larger context of the changing plan economy. Finally, I will discuss the basic principles of the 1960 Általános Rendezési Terv (the master plan for urban development, henceforth ÁRT) and how the implementation and non-implementation of the plans laid out in this formed Budapest as it was in 1970.

An important point for those arguing against the existence of any distinctly socialist model of urbanisation and thus socialist cities was the extant urban structures, the capitalist heritage, the basis from which socialist cities were to be built. Despite the destruction wrought in the “Battle for Budapest” towards the end of the war, the damage was not nearly as complete in e.g. Warsaw, which was as good as levelled.[60] Thus, most of “capitalist” Budapest remained when the socialist regime took over in 1947. Although the pre-war city was by no means perfect, as I will

[60] French, R. A. and F. E. I. Hamilton (1979) “Is There a Socialist City?” in: R. A. French, and F. E. I. Hamilton (ed) *The Socialist city : spatial structure and urban policy*, New York: Wiley: pp. 5-6

elaborate in the following, most of the significant urban development problems in Budapest which planners and other decision makers attempted to resolve during the socialist era emerged as a result of socialist policies.

Despite the inherent preference of socialism for plans and planning, the postwar reconstruction in most ECE cities, Budapest among them was not based on coherent master plans. The exigent measures chosen during this ad-hoc phase of urban development, and especially its heavy emphasis on immediate industrial advances was to affect the form and problems of socialist cities in ECE. Immediate initiation of planned development according to socialist principles was not, or was at least not seen as possible immediately after the socialist takeover of power in the late 1940s. According to French and Hamilton in their *Socialist Cities* this was "an inevitable consequence" of the Second world war.[61] As socialist regimes across Central-Eastern Europe strove to repair war damages, there was "... little regard to desirable yet longer term objectives".[62] That is, planned urban development according to socialist principles.

This was for the most part not due to lack of planners or ideas for how the city should look. The already well articulated Soviet conception of socialist urban development, was to some extent imported in all ECE countries, and in the development of "New Cities", these principles were in many cases applied.[63] Moreover, Hungary in general, but particularly Budapest also had a strong tradition for planned urban development, a clear example of which is the regularity of the core city in Budapest.[64]

Planners, initially primarily architects, with both Western and socialist backgrounds in terms of education, presented plans for Budapest's reconstruction immediately after the war. The proposed plan was modern and progressive, and addressed several of Budapest's significant urban problems, including the mixing of urban and residential functions, and also sought to move polluting industries

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61 French, R. A. and F. E. I. Hamilton (1979) "Is There a Socialist City?" in: R. A. French, and F. E. I. Hamilton (ed) *The Socialist city : spatial structure and urban policy*, New York: Wiley, p.6

62 French, R. A. and F. E. I. Hamilton (1979) "Is There a Socialist City?" in: R. A. French, and F. E. I. Hamilton (ed) *The Socialist city : spatial structure and urban policy*, New York: Wiley, p.6

63 Enyédi, G. (1996)"Urbanization Under Socialism", in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. pp. 104-105, p. 109 and p. 112

64 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: pp.31-37

downstream of the city. However, after the socialists assumed power in 1947, this plan was discarded.[65]

Rather, the lack of planned development was caused by expediency in the face of a perceived need for rapid industrial reconstruction and development. As Enyédi and Szirmai present it, the fact that this was perceived as such an overriding priority was due to several more or less interconnected factors; autarkic self reliance; preparation for a third world war, which was perceived as imminent in the socialist world; and finally because rapid economic achievements was an ideological goal.[66] In fact, the Rákosi regime, rather than emphasising the emancipatory nature of the socialism, put the weight of its propaganda apparatus behind advancing the principle of modernisation and " technical civilisation" through the development of heavy industries as the core mission of socialism, and thus also its main basis of legitimacy.[67]

. Accordingly, as I will discuss in more detail in the following, the establishment of new industries and the expansion of those already existing came to overshadow the need for planned urban development. Accordingly, the following description by R. A. French and I. F. E. Hamilton description of socialist efforts to develop ECE cities in the 1950s is also relevant for Hungary and Budapest: "what has been done has frequently not been in accord with ideals, theories, and optimum goals, but has rather taken the form of swift, inexpensive, and loosely controlled expediencies."[68] Although elaboration of a new, socialist plan for Budapest was initiated during the 1950s, this was not approved until 1960.[69] In the meantime, urban development remained ad-hoc and oriented towards facilitating industrial development.

Industrialisation was the main and practically sole objective of urban development in ECE countries in general, and also in Budapest. "...in the first phase urbanisation," as Enyédi puts it when commenting on ECE in general,

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65 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: pp.142-143

66 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 143

67 Szabó, M. (2000) "A Legitimáció Történelmi Alakváltozásai" n F. Nikosz and A. Örkény(ed) *Magyarország Társadalomtörténete 1945-1989: 2*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó: p. 127

68 French, R. A. and F. E. I. Hamilton (1979) "Is There a Socialist City?" in: R. A. French, and F. E. I. Hamilton (ed) *The Socialist city : spatial structure and urban policy*, New York: Wiley, p.7

69 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: p. 146

"industrialisation and urban development were (seen as) identical."[70] That is, the function of cities was facilitating industrial production and its development. In Budapest rapid and ad-hoc industrial development meant that very few changes happened in the spatial distribution of industrial areas, most of the now state owned enterprises were developed further at extant sites. All but one of the significant industrial zones bordered on the Danube.[71]

The focus on rapid industrialisation transformed Budapest, both in terms the composition and relative and absolute weight of its industrial branches, as well as the significance of industrial occupations among the city's inhabitants. In terms of the former, the socialist regime favoured the development of heavy industries, and while these already existed in Budapest, they now became more dominant.[72] In terms of the latter, industrial employment grew from around 300.000 in 1949 to around 600.000 in 1960. This constituted about half of the total number of new industrial workplaces created in Hungary in this period.[73] Although socialist industrial growth was labour intensive and inefficient, this is still a good indication of how much industrial output increased in Budapest.

The main problems facing Budapest as a project of urban development in the 1960s and 1970s were to a large extent the result of this rapid growth, coupled with insufficient levels of investment in urban infrastructures. In addition to the growth of industrial output, both the population and territory of the city grew significantly. The population grew by about 25% between 1949 and 1969, from 1.59 to 2 million. In 1950 the socialist regime merged pre war Budapest with the surrounding suburban settlements surrounding Budapest, and thus almost doubled the territory of the Hungarian capital.[74] I would argue that both these changes were a result of the drive for increased industrial output, and for the unified management of the industrial

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[70] Enyédi, G. (1996)"Urbanization Under Socialism", in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p. 115

[71] Barata, G. and G. Kukely (2004) "A Budapesti Ipar az Államsocializmusban és Bukása Idején" in: G. Barata (ed) *A Budapest Barnaövezet Megújulási Esélye:* Budapest: MTA Társadalomkutatóközpont: fig 1, p.48

[72] Barata, G. and G. Kukely (2004) "A Budapesti Ipar az Államsocializmusban és Bukása Idején" in: G. Barata (ed) *A Budapest Barnaövezet Megújulási Esélye:* Budapest: MTA Társadalomkutatóközpont: pp.35-36

[73] Barata, G. and G. Kukely (2004) "A Budapesti Ipar az Államsocializmusban és Bukása Idején" in: G. Barata (ed) *A Budapest Barnaövezet Megújulási Esélye:* Budapest: MTA Társadalomkutatóközpont: p.38

[74] Dr. Preisch G. (1970): "A Budapesti Városépités Eredményei – 25 év Mérlege" in: *Városépités,* 6(1-2): p.21

enterprises of the region, many of which lay outside the pre-war city.

While the infrastructure of the pre-war city was of high quality, the new peripheral districts added in 1950 were with some exceptions still semi-rural, for the most part with poorly developed infrastructural systems, among other things water-supply and sewerage.[75] Rapid population and industrial growth, as well as the extension of responsibilities to cover these underdeveloped areas meant that extant infrastructural capacities, including the housing stock, water supply and sewerage swiftly came under pressure. While resolving this situation was put at the top of the urban development agenda, as Dr. G. Preisch, then head of spatial planning at the National Architectural Institute stated when looking back at 25 years of urban development in 1970: "Increasing the production of Budapest's factories required such expenditure of resources that municipal investments in the field of urban development were forced into the background to some extent, or was at least primarily limited to symbolic projects (…..)"[76]

To a large extent due to the disproportionality between investments in housing and the number of new industrial workers moving to the city, engendered by the lack of any overall urban plan, housing was where the most acute shortage developed in Budapest. Due to the lack of an overall urban plan, as well as the low level of infrastructural expenditure, far fewer apartments were constructed in the city during the 1950s than the rapid population growth warranted.

The lack of available new housing even in the peripheral districts forced many of those who moved to the area to work in industry to settle outside city limits, in Pest county.[77] Thus, despite the rapid growth of population Budapest came to be characterised by what Szelényi defines as "under urbanisation", the far more rapid growht of industrial employment than of urban population, which he sees as a socialist urban trait.[78] Housing in the rapidly growing agglomeration which this brought into existence was solved in a traditional manner with detached family housing, funded and also often built privately. Moreover, while many of these

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[75] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: pp. 242-243

[76] Dr. G. Preisch, "A budapesti városépités eredményei – 25 év mérlege" in: *Városépités,*no 1-2, 1970, Budapest, pp.17-19

[77] Dr. G. Preisch, "A budapesti városépités eredményei – 25 év mérlege" in: *Városépités,*no 1-2, 1970, Budapest, p.19

[78] Szelényi, I. "Cities Under Socialism – and After" in *Cities after Socialism,* p.294

households set up in the agglomeration derived the significant part of their income from employment in Budapest's industries, intensively cultivated gardens and small-scale livestock rearing were widespread as supplementary sources of income.[79]

Shortages were however not limited to housing, most elements of Budapest's urban infrastructure came under pressure, among them transportation and provisioning, including public utilities.[80] Most significantly in relation to the subject of this thesis, there was considerable lag in the development of water production and also in terms of the capacity of the sewerage network to drain the increased volumes of industrial effluents. I will elaborate on the impact of the ad-hoc period of urban development on water management below, in section 2.2. Moreover, with investments in urban infrastructures being limited to what was deemed necessary for immediate satisfaction of industrial needs and symbolic projects, the Budapest region became even more monocentric as a result of the integration of the former suburbs. The pressures this created on the service provision institutions in the city core also came to be seen as a significant problem.[81]

Thus, rather than a bright, new socialist Budapest, the inhabitants of the Hungarian capital were faced with increasing urban problems, along similar lines as urban problems experienced in the West in the past. Congestion increased as industrial enterprises grew by expanding outside extant sites. Intermingling of industrial and residential functions, as well as the enforced cohabitation of apartments by several households led to mounting degradation of residential environments, just to mention a few problems. The neglect of civic investments and the lack of planning thus led to many of the classical urban problems which progressive urban planners in the west had sought to avoid, and also the socialist urban principles they had inspired were intended to counter. However, this neglect, while in form similar to what had been experienced in the capitalist past, and a result in a similar preoccupation with growth and progress was a result of the implementation of the socialist system of social organisation in Hungary and the priorities this engendered.

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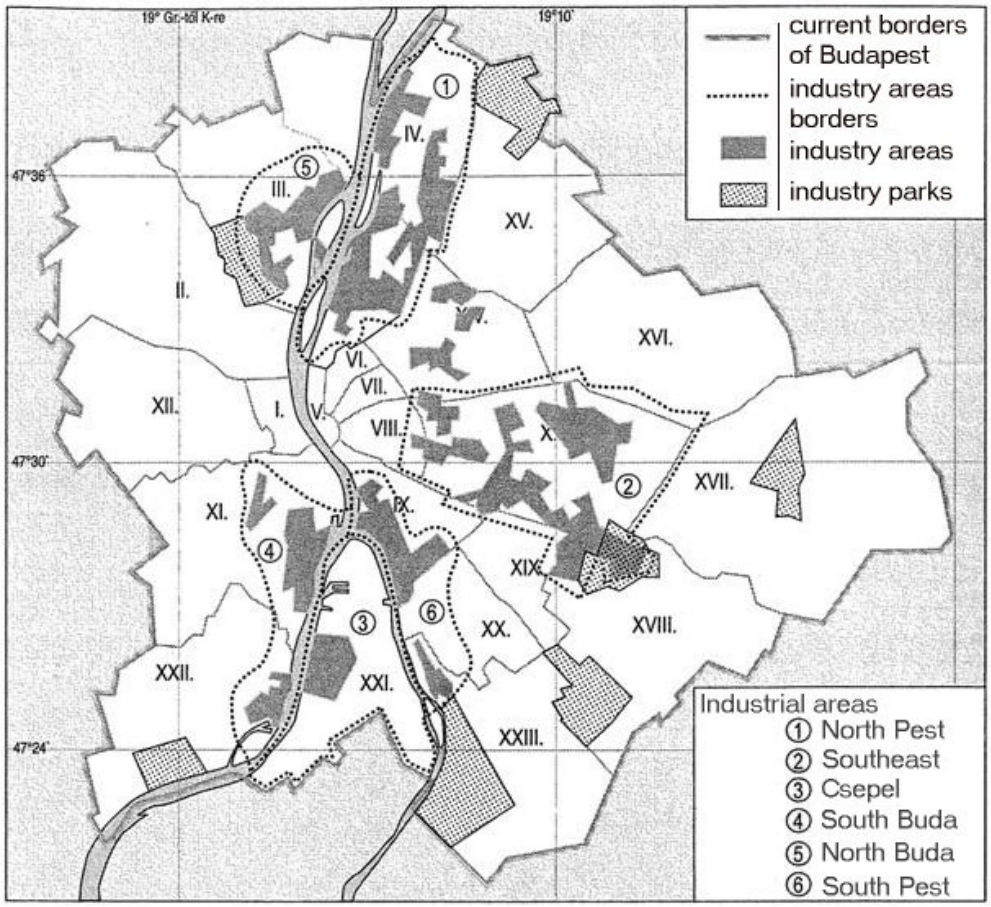
[79] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: p.122 and 148

[80] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: pp. 146-147

[81] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: pp. 146-147



Map 2: Budapest's Industrial Zones in the 1960s and 1970s (source: Bajnay, L and G. Kopcsayi (1998) “Az Ipar Fejlödése – Ipari Területek, Ipari Üzemek” in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p.48)

2.2.1 The Belated Initiation of Planned, Socialist Urban Development : Decision-Making, Funding and Planners

As mentioned above, the elaboration of a general plan for the development of Budapest had begun in the 1950s. This was both a matter of principle and exigency. The former since comprehensive planning was held forth as one of the cornerstones of the socialist urban project. The latter as a result of the clear and mounting problems hindering further growth in Budapest, both in terms of population growth, and more significantly, industrial output, as well as causing critical levels of discontent among the populace.

The latter had dramatic consequences already before planned urban development could be initiated. The hard work, declining standard of living and the urban environment which characterised the 1940s and early 1950s compared poorly

with the promises the regime had made of a bright socialist future.[82] The 1956 revolt, although its immediate cause was the termination of the budding turn towards more reformist and independent policies following Stalin's death in 1953, was in an underlying sense a result of discontent with the form material progress had taken in Hungary. That is, the lack of concern the regime was perceived as showing for the material needs and preferences of the people, as well as the perceived incompetency of the bureaucratic apparatus.[83]

As a consequence of this, the Kádár regime to which the Soviets handed power after the uprising had been put down, and which remained in power almost until the very end of the socialist era in Hungary, considered it necessary to make significant policy changes in order to consolidate it's right to rule. Although based on a wide range of policies, the main basis of what became known as "the Kádárist social compact", which would define how the economic system of Hungarian socialism functioned and also ultimately contribute to its downfall, was the idea that the new regime, in contrast with the old, worked for the people.[84]

On of the central things working "for the people" in the context of late 1950s Hungary entailed was improving the material standard of living.[85] In the short term this could be achieved through adjustment of prices and by improving the immediate availability of goods. However, in the long term it entailed more thoroughgoing policy changes. In order to ensure a long term improvement in the goods available to Hungarian consumers, more emphasis had to be given to consumer oriented light industries, although the development of heavy industries remained the main priority.[86]

Placing greater emphasis on settlement development was a necessity in order to improve the standard of living. Most clearly in Budapest, but also in other settlements where industrial production and thus also population had grown, as well

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[82] Szabó, M. (2000) "A Legitimáció Történelmi Alakváltozásai" n F. Nikosz and A. Örkény(ed) *Magyarország Társadalomtörténete 1945-1989: 2*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó: pp.126-129

[83] Szabó, M. (2000) "A Legitimáció Történelmi Alakváltozásai" n F. Nikosz and A. Örkény(ed) *Magyarország Társadalomtörténete 1945-1989: 2*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó: p.126

[84] Szabó, M. (2000) "A Legitimáció Történelmi Alakváltozásai" n F. Nikosz and A. Örkény(ed) *Magyarország Társadalomtörténete 1945-1989: 2*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó: pp. 133-135

[85] Szabó, M. (2000) "A Legitimáció Történelmi Alakváltozásai" n F. Nikosz and A. Örkény(ed) *Magyarország Társadalomtörténete 1945-1989: 2*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó: p.133

[86] Barata, G. and G. Kukely (2004) "A Budapesti Ipar az Államsocializmusban és Bukása Idején" in: G. Barata (ed) *A Budapest Barnaövezet Megújulási Esélye:* Budapest: MTA Társadalomkutatóközpont: pp. 36-37

as neglected rural settlements, some of the main factors holding back the standard of living were a result of the underdevelopment of urban infrastructures. This made the elaboration and adoption of urban master plans, like the one being elaborated for Budapest all the more pressing. Although the needs of the people inhabiting Hungary's settlements were now brought more to the fore, urban development remained based on ensuring industrial development. The development potential, and thus funding for the development of a settlement continued to e determined on the basis of its potential for harbouring industries.[87]

The structure and context of settlement planning underwent significant changes in the early years of socialism. During the course of the 1950s, according to Enyédi and Szirmai in their book *Budapest, a Central European Capital*, "...urban planning (…) moved from private design offices into state controlled offices." In these Soviet educated planners came to dominate, especially at the ministerial and municipal level.[88] Although planning was thus also conducted at the local level under the auspices of Budapest's Municipal Council, decision making in the field of urban planning and development remained highly centralised processes throughout the socialist era in Hungary. While formal decision-making power was given to the Ministry of Construction and Public Works, according to Enyédi and Szirmai, "real power rested with the Council of Ministers."[89]

The resumption of reforms in the wake of the 1956 revolt, although not as radical as those proposed prior to the Soviet Crackdown, still had wide ranging consequences for the socialist system, especially the economy. The economic reforms of the 1960s culminated in 1968 with the first phase of the NEM (New Economic Mechanism) reforms. While the regime with this reform package set out to alter the basic functioning of the industrial sector of the economy through decentralisation of decision-making measures aimed at making market processes more significant in the regulation of the economy, in the council sector and urban development decision making remained highly centralised.[90] The central government retained quite detailed

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87 Enyédi, G. (1996)"Urbanization Under Socialism", in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p. 112

88 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 144

89 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 143

90 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 162

control over most aspects of the urban development process. “The ultimate decisions on urban development issues” in ECE, according to Hamilton and French, “were taken by state organisations, primarily by the central organs of government and the party.”[91]

As Enyédi and Szirmai's go on to describe it: “the possibility of local planning was eliminated by the state socialist political structure, and the centralised management of society.”[92] Urban planning was no longer primarily the task of municipal authorities. The interests and priorities of those in power were determinant for the issues and concepts around which urban plans were drawn up.[93] When the former changed, the latter followed. This will be illustrated below in the section on the 1960 ÁRT of Budapest.[94] It is also very relevant in relation to the main subject of this thesis, development and environmental management of the environmental services provided by the Danube, which will be discussed in this and later chapters.

While centralised control over investment in urban infrastructure could very well have been able to facilitate rational, planned investment in priority areas, as I will discuss more elaborately in chapter 4, the industrial bias of the socialist regime in Hungary prevented this. The high level of centralised redistribution entailed that even the more affluent settlements like Budapest were dependent on central grants for any significant urban development projects. According to G. Enyédi and V. Szirmai, these funds “were redistributed according to the interests and preferences of the central authorities.”[95] Moreover, as I will discuss the significance of in chapter 4, the resources set aside for industrial and urban development were not separated, but were pooled in a single, unified central development fund.

Unlike other settlement councils, due to its size and significance the Municipal Council of Budapest performed both county and local tasks, and was thus as the only settlement in Hungary directly subordinate to the central government. Despite this, the Municipal Council had very limited influence on decision-making in relation to urban development. The real nexus of decision-making at the local level was the local

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91 French, R. A. and F. E. I. Hamilton (1979) “Is There a Socialist City?” in: R. A. French, and F. E. I. Hamilton (ed) *The Socialist city : spatial structure and urban policy*, New York: Wiley, pp.3-4

92 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 143

93 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 144

94 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 144

95 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 143

party organisation, which implemented the policies of the central party bodies.[96] In terms of planning and development the Municipal Council, or rather, for most of the socialist era its Executive Council, was primarily responsible for coordinating the implementation of centrally planned and funded infrastructural projects. The elaboration of urban plans remained sectoral, and each sector subordinate to the central body responsible for the field in question.[97]

As settlement development policies became more complex during the 1960s and 1970s bargaining between central and local authorities became an increasingly important aspect of the planning process.[98] Based on the dominant position of Budapest in Hungary's economic structure, through bargaining The Municipal Council was able to ensure additional funds, and more influence on where and how funds were to be spent.[99] While this did afford more flexibility, despite the fact that the Municipal Council had significant independent revenues, the centralisation of of funds and tight control over how funds were spent left little room for any significant independent development activities.[100]

2.2.2 The 1960 ÁRT: A Plan for a Socialist City

The centralised tendency of industrial development and the industrial bias of urban development led to increasing interregional inequality in Hungary during the 1950s.[101] By 1960 there were widespread demands at the regional level for more even, that is, decentralised development of both industries and settlements.[102] I would argue that reducing the inter and intraregional inequalities in terms of social and material standards of living was a central objective in the context of the Kádár regime's efforts to consolidate its power through improving the standard of living after 1956. Moreover, developing already highly centralised settlements like Budapest further in the same direction entailed its own costs and problems.

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96 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 160

97 Enyédi, G. (1996)"Urbanization Under Socialism", in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p.112 and Enydi and Szirmai, pp. 160-162

98 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 145

99 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 145

100 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p. 163

101 Lackó, L. (1988) *Területi fejlődés, politika, tervezés,* Budapest: Akadémiai Kiadó: p. 60

102 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, pp. 147-148

Thus, as the planned development of the settlement network as well as individual settlements came to the fore around 1960, decentralisation and development of the whole settlement network were in focus. However, the emphasis on industrial development remained. “Hungarian planners categorised cities according to their potential for harbouring industries, and their development potential rated according to this,” as Enyédi describes it.[103] While this was so, mono-centric urban development was no longer seen as an efficient way of facilitating industrial growth, and as mentioned above, broader, planned development of the full range of urban infrastructures was seen as necessary.

The 1960 ÁRT, the first comprehensive socialist urban plan drawn up for the development of Budapest, is a clear example of these new tendencies. With its scope including Budapest as well as 64 surrounding settlements, it clearly takes a regional perspective.[104] Budapest's growth was to be restricted, while the surrounding settlements were to be urbanised. As Enyédi and Szirmai describe it: “The plan presented a picture of the densely built up territory of the city surrounded by a belt of modern communities.”[105] The character of the resulting agglomeration was to be varied, with urban, high density modern housing areas broken up by low density housing, green areas and industrial zones. In other words the 1960 ÁRT “attempted to relieve the over-centralised capital by an agglomeration”.[106]

As I see it, this focus on decentralised development, restriction of growth and varied modernisation of the settlement network is clearly reminiscent of E. Howard's “Garden Cities” concept, which was the inspiration behind the New Towns being constructed in the UK.[107] Considering the fact that socialist planners generally had access to “... translated plans, materials and maps of Western, particularly British New Town designs and strategies,” as Hamilton and French emphasise when discussing Western influences on socialist planning in general, this is perhaps not so peculiar.[108]

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[103] Enyédi, G. (1996)“Urbanization Under Socialism”, in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p.112

[104] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p.147

[105] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p.147

[106] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p.148

[107] Hall, P. (2002) *Cities of Tomorrow: an Intellectual History of Urban Planning and Design in the Twentieth Century*: Oxford: Blackwell, pp. 89-96

[108] French, R. A. and F. E. I. Hamilton (1979) “Is There a Socialist City?” in: R. A. French, and F. E. I.

In concrete terms Budapest's development was to be constrained on several levels. A target population for the city was set at 2.3 million, with another 550.000 in surrounding settlements. In accordance with the emphasis on decentralisation the establishment of new industries in the capital was prohibited.[109] Moreover certain industries were also designated for relocation outside Budapest. This had a dual purpose; to ease the labour shortage in Budapest and facilitate economic development in other parts of the country. Those industries designated were, the most polluting as well as those for which location in Budapest was not a necessity or did not represent significant advantages in the form of cooperation, or if you will, cluster effects.[110] In terms of spatial growth, the extension of the built-up area was to be radial, along established routes of transport and public utility lines, rather than the North-South development along the Danube proposed in the 1940s.[111]

When it came to implementation during the course of the 1960s, few of these grand visions were realised.[112] Budapest's various infrastructures were by and large developed according to their separate plans and at a pace more in proportion with the city's still growing needs. However, the restructuring and modernisation of the agglomeration did not happen as planned. The Budapest region remained mono-centric for all intents and purposes.[113] This was to a large extent due to the fact that while Hungarian and also Budapest's industries continued to grow, they remained unprofitable and the plan economy struggled in the 1960s.[114]

Less funds were available in general, and for the subordinate sector of urban development in particular, decentralisation consequently became less of a priority at the national level.[115] The result of this in the Budapest region was that a conflict arose between the Budapest Municipal Council and the Pest County Council over the control of development resources. The Budapest Municipal Council was able to use its superior bargaining position to ensure that plans were revised to focus within

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Hamilton (ed) *The Socialist city : spatial structure and urban policy*, New York: Wiley, p.2

[109] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p.147

[110] Barata, G. and G. Kukely (2004) "A Budapesti Ipar az Államsocializmusban és Bukása Idején" in: G. Barata (ed) *A Budapest Barnaövezet Megújulási Esélye:* Budapest: MTA Társadalomkutatóközpont: p. 46

[111] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p.147

[112] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p.147

[113] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p.147

[114] Kürti, L. (1998) "Hungary" in S.P. Ramet (ed) *Eastern Europe : politics, culture, and society since 1939,* Indiana University Press: Bloomington, Indiana: p. 82

[115] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p.147

Budapest. This was based on arguments of efficiency, which during the 1960s joined equality as the core concepts around which settlement development policies revolved.[116] Budapest's need for the agglomeration as a source of cheap labour, rather than a series of expensive middle-class towns, was also an important argument.[117]

Thus, aside from more proportionality and a wider scope, Budapest's development did not follow the approved plan. Overall it remained quite ad-hoc and adaptive.[118] Despite the restrictions placed on them, the growth of Budapest's industries continued to be "... dynamic and extensive ..." according to Barata and Kukely. The results of the industrial re-localisation programme were limited.[119] Industrial activities remained dispersed throughout the city, in many cases within residential areas, and there were many firms which operated multiple sites.[120] The only sector of the urban plan where targets were met was in the housing program, where the plan targets were actually exceeded.[121] As planned, most housing development in the 1960s was restricted to the inner city, filling up empty lots left over from the war.[122] In terms of other infrastructures, while there was significant progress, targets were not met, mostly due to the scarcity of funds.

2.3 Socialist Budapest and the Danube as a Source and Sink:

Relying on the twin organic machines of the Danube for both water supply and waste water disposal, as well as the avoidance of conflict between them by striving to keep these functions spatially distinct, was thus the basis of Budapest's water management at the beginning of the socialist era. Like in the first half of the 20th century, this provided advantageous conditions for the growth of Budapest and its industries, in terms of both source and sink functions. However, as I will discuss in the following section, during the 1950s and 1960s, Budapest's rising demand for

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[116] Enyédi, G. (1996)"Urbanization Under Socialism", in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd: p. 110 and 112

[117] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, p.148

[118] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press, pp.147-148

[119] Barata, G. and G. Kukely (2004) "A Budapesti Ipar az Államsocializmusban és Bukása Idején" in: G. Barata (ed) *A Budapest Barnaövezet Megújulási Esélye:* Budapest: MTA Társadalomkutatóközpont: p.37

[120] Barata, G. and G. Kukely (2004) "A Budapesti Ipar az Államsocializmusban és Bukása Idején" in: G. Barata (ed) *A Budapest Barnaövezet Megújulási Esélye:* Budapest: MTA Társadalomkutatóközpont: p.37

[121] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: p.87

[122] Polonyi. K. (1971) "Budapest Álatalános Rendezési Terve" *Városépités,* (7) 6: , p.5

water and discharges of wastewater made the first basic changes in the spatial and technological structure of Budapest's water-management necessary.

In this section I will primarily be discussing how water-management was affected by urban development in Budapest during the 1950s and 1960s, and how from 1960 the development of the organic machines on which Budapest's water-management relied was integrated into the process of urban planning. Moreover, what perceptions of the Danube as a source and sink this was based on. This will establish the basis of Budapest's water resource situation in 1970, which together with the mounting quality problems of Budapest's water-supply and the consequences this had for the utilisation of the Danube as a sink in the long term, will be the subject of chapter 3.

2.3.1 The 1950s

In terms of the quality and quantity of available aquatic resources, there seems to have been no significant concern for Budapest's future at the beginning of the socialist era. This despite the planned rapid growth of industrial output and population, and the intensification of resource consumption this would entail. Szentendre Island, Budapest's predominant source of water, still had stretches of undeveloped bank-filtered aquifers, and furthermore, Csepel Island, downstream of the city, was as of yet untouched.[123] In terms of wastewater discharges, continuing the practice of entrusting effluent treatment to the river's intrinsic processes was to account for most of Budapest's discharges. Based on hydro-biological studies conducted in the late 1940s to determine the Danube's properties as a sink, the river's DO levels at Budapest were seen as high enough to allow significant intensification of its wastewater loading, with the exception of some specific areas. [124]

As was the case for Budapest's development in general during the 1950s, the main factors influencing the consumption of water resources were lack of planning, rapid industrialisation, and insufficient funding.[125] Industrial consumption of drinking water grew rapidly during the phase of classical Stalinist industrialisation in

[123] Hajdú, G. (1979)"A főváros Vizellátásának új Bázisa: a Csepel-sziget" *Budapest*, 17(5): p. 15

[124] Garami, T. et al. (1972) *Pest Város 1847. évi Csatornázási Szabályrendeletének 125 éves Évfordulója*, Budapest: Mezőgazdasági Könyvkiadó, p. 374

[125] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: pp. 244-245

Budapest. While the sources available to me only differentiate between household and non-household consumption prior to the 1960s, I would argue that in light of the massive growth of industrial output in Budapest during this period it is safe to assume that the majority of increases in this latter category were a result of industrial growth. As such, non-household consumption grew by 120 % between 1950 and 1960, that is from 36 % to 49 % of all water supplied by FVM.[126]

According to M. Rácz, in his chapter on the development of Budapest's public works in G. Preisch's history of urban development in Budapest, in addition to the increasing output of Budapest industries, the rapid growth in the volume and relative weight of industrial drinking water consumption was caused by a shift in how industrial water was obtained. As he points out, while many industrial enterprises at the end of WWII operated individual wells or water intakes, these were to a large extent abandoned during the 1950s. As the state began subsidise drinking-water heavily, it became cheaper to buy high quality bank-filtered water from FVM than to treat water of ever poorer quality drawn from the Danube or the often low quality industrial wells.[127]

As I have discussed earlier in this chapter, the focus on increasing industrial output left only scant funds for infrastructural development, including water supply. In addition to the rapidly growing demand for water the FVM also had to expend resources on taking possession of and improving the low quality water supply systems of the settlements which were merged with Budapest to form Greater Budapest in 1950.[128] This left little resources for the extension of household supply, or more significantly, for expanding water production capacity. Due to the latter, despite the fact that the volume of water supplied grew by 59% between 1950 and 1960, FVM was unable to anticipate demand. This led to regular water shortages both in winter when the yield of the bank-filtered aquifers was lower, and in summer when consumption peaked.[129]

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[126] Gilltner, A (1970) (ed) *Budapest Közmü és Mélyépitési Távlati Terve* (1971-1985), Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: table V, p.35

[127] Rácz, M. (1998) “A Közmüvek Fejlödése”, in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p. 244

[128] Rácz, M. (1998) “A Közmüvek Fejlödése”, in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p.244

[129] Rácz, M. (1998) “A Közmüvek Fejlödése”, in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: pp.245-246

Although at an insufficient pace, FVM did develop water production during the 1950s. In terms of volume, most of the new bank-filtered wells were sunk at Szentendre.[130] More significant in the context of this thesis, however, was the fact that FVM began to sink wells downstream of Budapest, on Csepel Island. According to P. Jancsár's 1993 125 year history of Budapest's Waterworks: "FVM started its establishment of wells here in 1949 with the then goal that Budapest's water supply should not only be based on the northern aquifers, but should also receive sufficient feed from the south." This was in order to facilitate the planned development of the southern fringes of the city.[131] The production of industrial water from surface water was also initiated along the Ráckeve Danube-branch in the late 1950s, in an effort to limit industrial consumption of drinking water.[132]

Rapid, forced industrialisation, population growth, lack of planning and the low priority assigned to infrastructural development also affected Budapest's use of the Danube as a sink, as well as the sewerage system making this possible. Industrialisation increased the volume and changed the composition of the wastewater discharged into the Danube at Budapest. According to T. Garami et. al., during the 1950s "the formerly household character of the capital's wastewater became increasingly industrial."[133]

As plans drawn up immediately after the war to move polluting industries to the south of the city were abandoned in the interest of rapid growth, industrial areas on both banks of the river in the north continued to grow. So did those further downstream. [134] Thus, a significant share of the intensified industrial load was discharged through the Angyalföld pump house, upstream of the city centre. Although Pest remained the most industrialised half of the city, the open drains of the Buda bank also contributed their share of industrial effluents. Moreover, the creeks which had their confluences with the Danube above or in Budapest also carried significant volumes of household and industrial wastewater from the settlements and industries

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[130] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p.244

[131] Jancsár, P. (ed) (1993) *A 125 éves Fővárosi Vízművek*, Budapest: Fövárosi Vízmüvek: p. 105

[132] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p.244

[133] Garami, T. et al. (1972) *Pest Város 1847. évi Csatornázási Szabályrendeletének 125 éves Évfordulója*, Budapest: Mezőgazdasági Könyvkiadó: p. 63

[134] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: p.147

along them, both outside and inside Budapest.[135]

The lack of any comprehensive sewerage development plan and insufficient levels of funding entailed difficulties also for FCSM (The Sewerage Works of the Capital). In the sewer catchments encompassing significant industrial areas the drainage systems became overloaded as industries grew faster than any sewerage plan had anticipated.[136] In terms of wastewater treatment, FCSM operated several small treatment installations around the Ráckeve Danube-branch, at the head of which the construction of Budapest's first large biological treatment facility was initiated in 1955.[137]

These installations were aimed at preserving the quality of water in this regulated branch of the Danube, which due to its artificially slow-flow and relatively small volume was particularly sensitive to pollution and was used for recreational purposes.[138] Moreover, the so called South-Pest biological STW (Sewerage Treatment Works) was also intended as a learning project, establishing a knowledge and experience basis for future larger scale implementation of biological wastewater treatment.[139]

2.3.2 Thinking About the Long Term: The Resumption of Planned Water-Management Development in the 1960s

As an important part of the process of initiating the planned development of Budapest, of which the primary end product was the 1960 ÁRT, long term plans were also drawn up for the development of water supply and drainage. Water supply especially, but also sewerage were among the infrastructural fields where it had become most clearly obvious that ad-hoc development would no longer suffice. “The Long Term Plan for the Water Supply of Budapest (1960-1974)” was approved in 1960, while “The Long Term Plan of the Capital's Sewerage” was approved in 1962. The parameters of these plans, in terms of volumes to be dealt with and the spatial

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[135] Bulkaí, P. and T. Rácz (1970): “Budapest Környéki Településgyürü Vízellátása és Szennyvízhelyezse” *Hidrologiai Közlöny* 50 (8): pp. 246-247

[136] Rácz, M. (1998) “A Közmüvek Fejlödése”, in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p.248

[137] Rácz, M. (1998) “A Közmüvek Fejlödése”, in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p.249

[138] Rácz, M. (1998) “A Közmüvek Fejlödése”, in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p.249

[139] Rácz, M. (1998) “A Közmüvek Fejlödése”, in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p.249

foci of network development, were based on the direction of development of Budapest's water consuming sectors laid out in the ÁRT. The consequent escalation of both the pace and scope of water supply and sewerage development was to be facilitated by what Gács describes as expectations of "improved investment conditions" during the 1960s. [140]

The most important aspects of these plans was that they departed from the established water management practice in significant ways, as described in the second part of this chapter. In the following I will primarily be focusing on the consequences of the long term water supply development plan, as there were fewer basic changes in the long term plan for sewerage, and sewerage development will moreover be dealt with extensively in chapter 3. The overarching goals of the long term water supply plan was to increase the ratio of households in Budapest being supplied by FVM, ensuring ample supply of water for both households and industry, as well as eliminating the regular water shortages. Increasing per capita consumption of water was also held forth as a priority.[141] This was to a large extent due to the insistence of the central government, as copious access to water was seen as an important part of the project of increasing the standard of living.

In the context of this thesis it is the goals regarding short and long term development of water production, or more specifically the means chosen to achieve them, which are most significant. In the long term, Budapest was to continue to rely on the organic-machine of bank-filtered Danube water. According to the Long Term Plan, among the well groups to be developed was the one established at Szigetszentmiklós, along the Ráckeve branch of the Danube, downstram of the city.[142] This despite the fact that there had been debilitating quality problems at these wells since 1949.[143] In order to deal with the water shortages, the treatment of surface water abstracted at the southern tip of Szentendre Island was chosen as a supplementary source of drinking water.[144]

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[140] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p. 245 and 249

[141] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p. 245

[142] Gilltner, A. (1970) (ed) *Budapest Közmü és Mélyépitési Távlati Terve* (1971-1985), Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p. 38

[143] Némedi, Dr. L. (1988) "A Fövárosi Vízgazdálkodás Néhány Környezetegszségügyi Kérdései" *Budapest Közegészségügy*, 20(3): p.75

[144] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-*

Expanding the significance of the Csepel aquifers in the water supply was considered necessary primarily for two reasons. First of all, after over 50 years of continuous expansion the limit of further expansion of drinking water production from bank-filtered wells on Szentendre Island was in sight.[145] Secondly, around 1960 more than 80% of the bank filtered water supplied by FVM was still drawn from the Szentendre aquifers, and redressing this imbalance in order to facilitate the development of the southern parts of the city was still considered a priority.[146] The choice of surface water treatment, on the other hand, was dictated by the fact that it was found to be the quickest and most cost effective way of resolving the water shortages, and that this solution promised copious water independent of the water level of the Danube at any given time.[147]

The development of bank-filtered wells downstream of Budapest obviously entailed considerations of the resilience of the bank-filtering process to various pollutants. As I have mentioned above on p. 27, the exposure of bank-filtered aquifers used for water production to local pollution sources was considered risky already when this first occurred in the inner city in the 1930s. With this in mind, I would argue that the siting of the first Csepel wells along the Ráckeve branch in the late 1940s was done in order to avoid the expected intensification of pollution in the main Danube-branch. Furthermore, that although the level of pollution in the Ráckeve-branch must have been considered low enough to not be considered a risk. Even so, as I have mentioned above, early efforts at biological wastewater treatment during the 1950s and 1960s were focused on the Ráckeve branch.[148] This was primarily in order to preserve the recreational functions of this branch of the Danube, but the fact that it coincided with the escalation of water production development there indicates a connection.

The debilitating quality problems of the aquifers in the Szigetszentmiklós area were not your conventional drinking-water quality problem. The levels of pathogenic

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1990, Tanulmány, Budapest: Müszaki Könyvkiadó: p. 245

145 Jancsár, P. (ed) (1993) *A 125 éves Fővárosi Vízművek*, Budapest: Fővárosi Vízmüvek: p. 105

146 Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p. 256

147 Gilltner, A. (1970) (ed) *Budapest Közmü és Mélyépitési Távlati Terve* (1971-1985), Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: pp. 37-38

148 Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed)*Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p. 249

micro-organisms in the abstracted water was not unmanageably high, nor were there any significant problems with the conventional water chemistry parameters. However, shortly after they had been sunk in 1949, the water from these wells was found to contain high levels of iron and manganese ions. As a result the water was not considered suitable for human consumption without treatment or mixing with higher quality water.[149]

The significance of this problem was that conventional sand filtering was not considered sufficient to remove these mineral pollutants. Until appropriate treatment technologies could be built, the waters with above regulation levels of iron- and amganese-ions either had to be mixed with higher quality waters, or left unused..[150] One thing is certain, developing these aquifers further despite these limitations is a clear sign that ensuring favourable conditions for the development of the southern periphery was considered a priority for central decision-makers.

However, as described it around 1970, surveys conducted in the 1960s systematically mapped areas on Szentendre Island with similar problems.[151] On the basis of this I would argue that it is likely that stretches of aquifers with elevated iron-manganese levels had already been found on Szentendre prior to 1960, and the phenomenon thus perceived as localised. Thus, further development of the Szigetszentmiklós well group might have been based on the assumption that iron-manganese problems would be limited to relatively small areas also there. However, as I will elaborate on in chapter 3, this was not so, mainly due to the hydrological character of the Ráckeve branch.

Another significant goal in water supply development set out for the 1960s was to improve the supply situation for household consumers. In the public utility sector, the extension of water supply to new areas, increasing per capita household consumption and ending the prevailing water shortages became one of the more significant ways in which the Kádár regime sought to improve the standard of living in Budapest. As M. Kaika has pointed out in her book *A City of Flows*, during the late

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[149] Némedi, Dr. L. (1988) "A Fővárosi Vízgazdálkodás Néhány Környezetegszségügyi Kérdései" *Budapest Közegészségügy*, 20(3): p.75

[150] Gilltner, A. (1970) (ed) *Budapest Közmü és Mélyépitési Távlati Terve* (1971-1985), Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága:, p.44

[151] Gilltner, A. (1970) (ed) *Budapest Közmü és Mélyépitési Távlati Terve* (1971-1985), Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága:, p.44

19th and early 20th century, improvement of water supply was in problem ridden capitalist cities employed as a symbol of progress and urban improvement.[152]

This symbolic application of water-supply also came to be important in socialist Hungary. Modern, piped, public water supply, distributing high-quality water to households to be accessed and consumed through individual taps and in individual bathrooms was put into service as a symbol of the modern, urban Hungary which the socialist regime was building. Public water supply came to be equated with a "(...)cultured, urban way of life(..)", Bulkai and Rácz put it in their 1970 article.[153] Per capita household water consumption came to be a benchmark of progress and the regime's efforts on behalf of the populace. As "The living standard and culturedness is symbolised also by the volume of per capita water consumption."[154]

However, although resources for increasing water production were to be more copious in the 1960s, they were still limited. As a result of this, continued growth of industrial drinking-water consumption at the pace seen in the 1950s had by 1960 come to be considered as being in conflict with improving household water-supply by Budapest's water managers and thus subsequently its urban and economic planners. The construction of the South Pest industrial waterworks in the late 1950s was an early effort to redress this situation, by making an alternative available for industries and industrial processes which did not require high quality water.[155] In the 1960s, in addition to further development of this separate industrial water-supply system, plans were also made for increasing the price of drinking-water for industrial consumers.[156]

In terms of sewerage and the Danube's function as a sink, the long term plan, the Keretterv, was less ambitious than its counterpart for water supply. Its most significant point was that it declared as a long term principle that "*all dry weather wastewater of the capital must be subjected to biological treatment before discharge into the recipient."*(original italics).*[157]* However, treatment was not yet considered

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[152] Kaika, M. (2005) *City of flows : modernity, nature, and the city:* New York : Routledge, pp. 25-36

[153] Bulkaí, P. and T. Rácz (1970): "Budapest Környéki Településgyürü Vízellátása és Szennyvízhelyezse" *Hidrologiai Közlöny* 50 (8): p.371

[154] K.A. (1971) "Mindenapi Vízünk" in: *Budapest*, 9(6): p.5

[155] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p.244

[156] Gilltner, A. (1970) (ed) *Budapest Közmü és Mélyépitési Távlati Terve* (1971-1985), Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p. 43

[157] Garami, T. et al. (1972) *Pest Város 1847. évi Csatornázási Szabályrendeletének 125 éves Évfordulója*, Budapest: Mezőgazdasági Könyvkiadó: p. 65

necessary, that is, although the water quality in the Danube was deteriorating gradually, its capacity as a sink was still seen as sufficient to deal with planned increases in wastewater loading. On this basis the 1962 plan was mostly preparatory, in that further centralisation of drainage was to lay the basis for treatment in the future.[158] The only concrete efforts in terms of biological treatment was that the South Pest STW was to be completed during the 1960s, due to the special water quality needs of this part of the Danube.[159] This, as well as the preparations made in order to facilitate the biological treatment of Budapest's wastewaters will be discussed further in chapter 3.

2.4 Chapter Summary

The advantageous water management regime established in Budapest during the late 19th and early 20th centuries was based on an international body of scientific knowledge and engineering practice. This encompassed definitions of what constituted drinking water risks, initially bacteria, engineering solutions designed to avoid these, as well as early methods of quantifying sink capacity, initially limited to the ratio of dilution required. This shared urban sanitation paradigm evolved during the early 20th century. It came to also include such parameters as DO (dissolved oxygen) in the quantification of sink capacity, as well as the accompanying focus on the organic load of urban wastewaters, which depleted the former and its perceived capacity to eliminate bacteria, still the predominant public health concern.[160]

Even in light of the changes of the water management shared in the developed world, Budapest's water management regime remained very advantageous. However, already in the 1930s the first signs of cracks were beginning to show. Due to urban and industrial growth and the exigent solutions in terms of wastewater disposal this led to, changes in the spatial organisation of the source and sink functions utilised at Budapest, their increased intertwinement, led to calls for wastewater treatment. This, however, was a localised issue, and although too costly to be implemented in the 1930s, the plan remained.

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[158] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p. 249

[159] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p. 249

[160] Keeling, A. M. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" *Urban History Review/Revue d'histoire urbaine* 34(1): p.60

The rapid and unplanned urban and industrial growth of the 1950s, as a part of the general backlog of urban problems it caused, also entailed that further departures from this established water management regime were perceived as necessary. Urban growth, unplanned or planned, however, is not an exclusive socialist phenomenon. Neither is the fact that it is accompanied by growing water consumption and the mounting load of wastewaters to be discharged this in turn entails.

However the concrete policies which led to this development in Budapest were socialist policies. The concrete decisions were made in the context of socialist ideology and a socialist socio-economic system. I am inclined to agree with Enyédi, when he argues that the unplanned way in which Budapest developed in the 1950s, as well as the infrastructural problems the heavy handed emphasis on industrial development led to arose due to the workings of the socialist system.[161] It is, however, important to emphasise, that in the 1950s, many of the other principles of the socialist system were put aside due to the perceived need for rapid industrial development.

Although the 1960 ÁRT aimed at resolving many of Budapest's urban problems, this was to entail further increases in water consumption and wastewater discharges. Although the decision-makers and planners with this plan aimed at a more balanced, as well as conceptually and ideologically oriented path forward, industrial development continued to be at its core. Now, however, it was accompanied by increasing focus on modernisation of the housing stock and other elements of the urban structure. As I have argued, this path forward, although conceptually similar to western urban plans being implemented at the time was still aimed at attaining socialist goals: economic growth through industrialisation as well as improvement of the living standard through urban development and the improved supply of goods, including water.

As I will discuss in the next chapter, improving the housing standard, as was accomplished despite the problems with implementing the 1960 ÁRT, entailed new upwards pressures on water consumption. The drinking water consumption projections on which the long term water supply plan was based took continued growth into account. The expected growth made both the exigent measure of the

[161] Enyédi, G. (1996)"Urbanization Under Socialism", in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd: p. 112 and 115

surface waterworks necessary, as well as further explorations of the Csepel aquifers, downstream of the city.

Furthermore, although the 1962 announcement that full biological treatment of Budapest's wastewaters was the long term goal was a to a large extent a response to the rapid deterioration of surface water quality at and below Budapest, there was more to it. As I will argue in chapter 3, although Budapest's reliance on the Csepel aquifers were still limited, these were the city's future water reserves. Water management in Budapest was still informed by the overall aim of keeping the parts of the Danube utilised as source and sink distinct in order to avoid use conflicts. Thus, the prospect of producing drinking-water through the organic machine of bank-filtering from the already polluted waters of Csepel, which as the path laid down in the 1960 ÁRT were soon to be even more so, was seen as cause for concern. Thus, wastewater treatment was intended to prevent this potential problem.

As I see it, the departure from the basis on organic machines and the established spatial order of Budapest's water management were both cause and sign of how socialist urban and industrial development led to decreasing advantages in terms of water resource endowments. However, the concrete measures prescribed by the long-term water management plans drawn up around 1960 were as yet only tentative departures. They did however entail that as FVM and FCSM pursued the implementation of these plans, some part of the work which Budapest had relied on the intrinsic processes of the Danube to perform, in terms of water and wastewater purification, now came to be conducted through more directly anthropogenic processes.

However, the long-term goal of full biological wastewater treatment indicated that this process would escalate in the long run. Progressively more of the work in the 1960s performed by the Danube in terms of neutralising urban and industrial wastes would be performed through anthropogenic means. As I will discuss in the next section, the decision on when to start implementing treatment of the wastewaters discharged into the main branch was a matter of when this would be necessary, not a matter of principle. That is, when the polluting effects of using the Danube as a sink would reach such a level that it came into conflict with other uses.

3 Chapter 3

Pursuing the goals laid out in the 1960 ÁRT, the Hungarian socialist regime accomplished a significant acceleration of urban development in Budapest during the 1960s, and considerable advances were made in terms of modernising the infrastructure of the city. Many of the advances, most obviously the many apartments built but also the rapid increase in water production achieved by FVM, entailed that the standard of living of Budapest's inhabitants was improved. However both at a general level, as well as in terms of water related infrastructures, economic problems entailed that the planned level of investment could not be maintained.

As a consequence of this, ad-hoc alterations and re-prioritisations were made during the implementation of the ÁRT and many of its sub-plans which diverged from what had been planned. These divergence ranged in scale from the grand, conceptual level to a generally pervading imbalance between infrastructural sectors. In terms of the former, that the ambitious goal of resolving Budapest's development needs in a regional perspective was abandoned. While the latter encompassed the lower than planned achievements in sub-sectors of the plan, including service provision, transportation, as well as the network development planned by both FVM and FCSM.

Thus, although significant advances were made, important imbalances remained despite the overall coordination the ÁRT was meant to offer. The planned revision of the ÁRT in 1970 resulted in a new master plan which in many respects was less ambitious than its predecessor. However, in comparison to what had actually been achieved in the 1960s, it was still an ambitious plan. As I will argue in this chapter, this intensification of effort was based on a belief that ongoing economic reforms and a phase-shift in industrial development would lead to a significant improvement in the funds available for urban development, and also for environmental protection. As G. Enyédi and V Zentai put it in reference to the 1970s: “for the first time, the rise in the living standard enabled the government to extended its Programme from the increase of consumption to the improvement of the quality of

life."[162]

The course for the further modernisation of Budapest set out in the 1970 revision of the ÁRT also entailed important changes in Budapest's water management. The consumption of the Danube as a source and sink was planned to continue to grow significantly. As in the past facilitated by the organic machines established on the Danube's intrinsic processes. Unlike in the 1950s and 1960s, as a result of a planned phase-shift from extensive to intensive industrial development and plans for the escalation of housing development, the household sector was now expected to contribute the most to growing drinking-water consumption.

While plans for Budapest's consumption of the Danube as a source were thus still, as in the 1960 oriented towards anticipating consumption and thus towards facilitating significant increases in the volume of water produced, new concerns overshadowed this. In order to keep up with the projected growth of water consumption, it was deemed necessary to shift the focus of the development of bank-filtered water production downstream of Budapest, to western Csepel, along the main branch of the Danube.

Thus, this branch of the Danube was planned to serve as both source and sink for Budapest. While the Danube had been both source and sink since the early years of modern water supply and sewerage in Budapest, and even on the same stretch of the Danube since the 1930s, this had not been the Csepel section of the river, where all of the capital's wastewater gathered. Thus this prospect caused concern among water quality and public health specialists. It was feared that the intensified utilisation of the Danube as a sink which the continued growth of water consumption entailed would lead to significant quality problems with the drinking-water abstracted from the western Csepel aquifers. Or in other words, that the twin organic machines of the Danube would become incompatible, and that Budapest's advantageous water resource situation would thus become less so.

Thus as a consequence of the spatial distribution of bank-filtered water resources, one might say that the socialist regime was forced to choose between the two organic machines which ensured these advantageous water resource endowments. Due to among other things the increasing symbolic significance the

[162] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 215

Kádár regime assigned to environmental protection, the choice made was in the long term phase out the utilisation of the Danube for the neutralisation of Budapest's wastewaters. Thus, in 1974 the Program, an ambitious plan for the implementation of full biological wastewater treatment by the year 2000, was approved.

This was based on the same assumptions about improved investment conditions as the ambitious goals of the 1970 ÁRT, as were the planned institutionalisation and intensification of environmental protection efforts in general. In fact, as I will argue in this chapter, the Program and its aim of rational development of the environmental services provided by the Danube was an early example of what the regime intended to be a wider model of planned socialist environmental development.

This chapter will consist of three main parts. In the first I will discuss the overarching plans for Budapest's development in the 1970s set out in the ÁRT, the priorities these reflected as well as the assumptions about Hungary's future economic development they were built on. This will also establish how the major factors determining the growth of the consumption of the Danube as a source and sink, as well as the wider context in which water management plans for Budapest were developed.

The second part will concern itself with how water quality and public health specialists came to perceive the planned parallel utilisation of the Danube downstream of Budapest as source and sink as problematic. After an introduction to the topic, I will move on to discuss how projections of drinking water demand based on the course laid out by urban planners and central decision makers in the ÁRT led development of the aquifers on western Csepel being perceived as necessary. I will then move on to look at how the risk exposure of Budapest's drinking water sources was perceived, and how the planned development of wells on western Csepel was seen in this context. I will then round off part 2 with a discussion of how the planned utilisation of the main Danube-branch along Csepel as a source affected the perceived capacity of the Danube as a sink.

The third part will be focused on the conceptual development of the Program, how this reflected the reconsideration of the Danube's capacity as a sink, as well as other policy goals associated with the preservation and eventual improvement of

surface water quality. The first subject to be addressed in this part of the chapter will be the relationship between the socialist system and environmental protection, which I see as an important part of the context in which the Program was formed. I will then move on to discuss how the plans for full biological treatment developed from the Kereterv in 1962 to the Program in 1974, and how wider concerns than the protection of drinking water quality influenced this process.

3.1 Prospects, Concepts and Problems: Plans for Budapest's Development around 1970

As I will focus on in the following part of this chapter, the revision of the ÁRT (Master Plan for the Development) for Budapest approved in 1970 enshrined, in a plan format, the ad-hoc departure from the regional visions of the 1960 ÁRT which had been implemented through the 1960s. It was thus conceptually less ambitious in scope than its predecessor. However, it still drew up an ambitious agenda of urban development, in terms of the range and scale of the issues to be dealt with. As the 1960 ÁRT had been, the agenda of the 1970 ÁRT was predicated on the assumption of significant improvement in the availability of funds for the various aspects of urban development in Budapest. As essential elements of the urban structure, the 1970 ÁRT as a matter of course also contained separate sections on water supply and wastewater disposal. I will discuss these plans separately in later parts of this chapter.

In terms of the expectations of improved availability of funds, this was based on the economic reforms being implemented during the time when these plans were being elaborated. Moreover a phase shift was also expected in the Hungarian industrial sector. The period of extensive industrial development which had been going on since the beginning of the socialist era, and had limited the availability of funds for other purposes was seen as drawing to a close by the regime. Now would come the era of intensive industrial development.[163] Together with the economic reforms this would provide sufficient resources for building the socialist tomorrow that the regime had promised.

As noted in the previous chapter, despite rapid industrial growth in terms of output, the Hungarian plan economy struggled in the 1960s. Although the initial

[163] Preisch, Dr. G. (1975) " Budapest 1945-1975", in *Városépités,* 11(2-3): p.20

emphasis placed on heavy industries and autarky had been lessened after 1956, supplemented with a focus on light and consumer oriented industrial branches, many other aspects of the Stalinist economic model had persisted. Examples of this were over ambitious and escalating plan targets, over investment in the industrial sector and detailed central control in the elaboration of plans.[164] The focus in plans and development had been on productive capacity and output volume. There had not been much focus on profitability or efficiency in production or investments.[165]

3.1.1 The Continued Modernisation of Budapest After a Socialist Pattern: The 1970 ÁRT

Despite the significant shortfall in the implementation of the 1960 ÁRT, when time came for its revision in 1970, the new plans drawn up, while different and perhaps more realistic, were still quite ambitious. The 1970 ÁRT "*intended to result in the renewal of the entire existing urban structure.",* as K. Polonyi emphasised in his 1971 review of the plan.[166] Improving the standard of living through continuation and acceleration of the housing program was now at the centre of the plan.[167] However, as I will discuss in more detail below, the changes in the urban structure the housing plans entailed necessitated significant investments across the board.

The belief that it would be possible to make such significant advances in the modernisation of the Hungarian capital was based on the conviction among planners and central decision-makers that the economic conditions limiting urban development in the 1960s would change. This was to happen through significant macroeconomic reforms. The NEM (New Economic Mechanism) reforms introduced in 1968, were to combine the long term perspectives and ideological orientation of the plan economy with the efficiency of the market.[168] This was to improve the efficiency and profitability of the industrial sector, and thus making more money available for investments outside the industrial sector.

Of the immediate measures introduced, the most significant was the liberalisation of pricing and decentralisation of decision-making in the industrial

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[164] Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso: p. 93
[165] Kürti, L. (1998) "Hungary" in S.P. Ramet (ed) *Eastern Europe : politics, culture, and society since 1939,* Indiana University Press: Bloomington, Indiana, pp. 81-82
[166] Polonyi. K. (1971) "Budapest Álatalános Rendezési Terve" *Városépités,* (7) 6: p.5 (italics in original)
[167] Polonyi. K. (1971) "Budapest Álatalános Rendezési Terve" in: *Városépités,* (7) 6: p.5
[168] Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso:, p.99

sector. However, in the medium term the allocation of profits were also to be decentralised and enterprises were to become self sufficient in terms of investments, that is, no longer dependent on subsidies. In addition to the increased allocative efficiency the macroeconomic reforms were intended to ensure, the increased profitability of Hungary's industries were to be a result of intensive (efficiency) development and export orientation.[169]

The whole reform package was based on certain assumptions about the future development of the world economy. The two most significant were that the stable growth of the post war era would continue, and that productive capacity would remain the most decisive factor for economic performance. Despite only partial implementation the reforms initially had a favourable influence on economic performance in the years until the first oil crisis.[170]

Although the NEM reform did not alter the centralised nature of decision-making and funding of urban development, increasing industrial profits and decreasing subsidies were by central planners and decision-makers expected to free up considerable sums. However, they still expected that industrial development would represent a significant strain on central fund in the medium term. Thus, the tension between continued industrial investments and the ideological and legitimising principle of improving the standard of living, while diminished, would still continue. Thus, as Enyédi and Szirmai put it, also for the 1970s the "(c)onsistent aim of the central authorities [in urban development] was to find some solution to the contradictions between economic policy and ideology."[171]

By 1970 the policies of the Kádár regime had succeeded in achieving another leap in the standard of living. In Budapest an important factor contributing to this was the achievements of state funded housing development, initiated in 1960.[172] The ÁRT approved in 1970 had the overall aim of continuing this positive trend. However, in

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[169] Antál, L.(2000) "Fejlödés – Kitrövel: A Magyar Gazdasági Mechanizmus a 70-es Években" in F. Nikosz and Örkény, A. (ed) *Magyarország Társadalomtörténete 1945-1989*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó: pp. 275-277

Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso:, p.99

[170] Antál, L.(2000) "Fejlödés – Kitrövel: A Magyar Gazdasági Mechanizmus a 70-es Években" in F. Nikosz and Örkény, A. (ed) *Magyarország Társadalomtörténete 1945-1989*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó: p.277

[171] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: p. 144

[172] Preisch, Dr. G. (1970): "A Budapesti Városépités Eredményei – 25 év Mérlege" in: *Városépités,* 6(1-2): p.19

their choice of how to achieve this, the responsible planners departed from the 1960 ÁRT in many respects. This was, as K. Polonyi put it in 1971 "made necessary by the acceleration of the city's development and the concrete investments carried out during the IV and V five year plans."[173]

In terms of basic concepts the 1970 ÁRT was in some respects less ambitious than its predecessor. Rather than a solution to Budapest's growth needs based on decentralised modernisation of large parts of the agglomeration, the focus was now firmly on intensive development within the borders of Budapest.[174] Although the restrictions on growth of the 1960 ÁRT were eased, the outward extension of the built up area was still to be limited, as it had in the 1960 ÁRT, in order to limit the costs of infrastructural development.[175]

In terms of housing development, the overriding priority of the plan, 110 000 apartments were still lacking in Budapest in 1971, despite significant advances in the 1960s.[176] As the availability of vacant plots in the inner city had been exhausted during the 1960s, two parallel development trajectories were chosen by planners and decision makers. The intensification of housing densities in the inner city through reconstruction, and the construction of intensive housing clusters along already existing lines of transportation and public utilities on greenfield sites (previously not built on).[177] The 1970 ÁRT also depart from the goals of the 1960s in terms of industrial development. However, although new areas were set aside for industrial uses, any further industrial growth was to happen in a concentrated manner.[178]

The choice by planners and central decision makers to opt for significant greenfield housing development made the development of many other aspects of Budapest's infrastructure necessary, many of these in themselves expensive projects. This included the extension of both public and road transportation networks as well as service provision facilities to the new peripheral estates. The latter also included

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[173] Polonyi. K. (1971) "Budapest Álatalános Rendezési Terve" *Városépités,* (7) 6: p.5

[174] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: p. 148

[175] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: 148

[176] Polonyi. K. (1971) "Budapest Álatalános Rendezési Terve" in: *Városépités,* (7) 6: p.5

[177] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: p. 148

[178] Barata, G. and G. Kukely (2004) "A Budapesti Ipar az Államsocializmusban és Bukása Idején" in: G. Barata (ed) *A Budapest Barnaövezet Megújulási Esélye:* Budapest: MTA Társadalomkutatóközpont: pp.46-47
Lackó, L. (1988) *Területi fejlődés, politika, tervezés,* Budapest: Akadémiai Kiadó: p.100
Polonyi. K. (1971) "Budapest Álatalános Rendezési Terve" *Városépités,* (7) 6: p.6

water supply and sewerage infrastructures. This came in addition to the already extant development needs caused by the tension between the mono-centric character of the Budapest region in terms of employment and service structures on the one hand, and the decentralised pattern of housing functions on the other.[179] This latter factor was to a large extent the combined result of the tendency of the socialist system towards centralisation and the focus on efficiency, which had grown during the 1960s.[180]

Even more relevant for the subject of this thesis is how intensive greenfield development affected the development of the Danube's source and sink functions, as well as the infrastructural networks mediating between them and the city. As I will expound on later in this chapter, the intensity and spatial distribution of state-financed housing development influenced the core topics of this thesis in several significant ways; In terms of the spatial foci and cost of network development; the spatial focus of the development of drinking water production; and the phasing and siting of STWs.

The ambition of these planned changes, as Polonyi notes, ”can only be compared with the construction boom in the period between the unification of the city and the millennium(..)” in the history of Budapest.[181] In other words, the projects and changes outlined in the 1970 ÁRT were considered path-breaking in terms of the physical structure of the city. I would argue, that to a large extent these significant investments and changes in the city's physical structure had been made necessary by the regime's focus on the standard of living.

As the abandonment of the plans for garden cities and satellite towns in the agglomeration to some extent illustrates, overambitious plans were nothing new in settlement planning for the Budapest region. In a similar manner as the under-implemented 1960 ÁRT, its 1970 successor was predicated on significant increases in funding. The goal of renewing ”*the entire existing urban structure.”,* which Polonyi emphasised, was much more ambitious than the significant, although as yet

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[179] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: p. 109 and 110
Polonyi. K. (1971) “Budapest Álatalános Rendezési Terve” *Városépités,* (7) 6: p.6

[180] Enyédi, G. (1996)“Urbanization Under Socialism”, in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd: p. 110

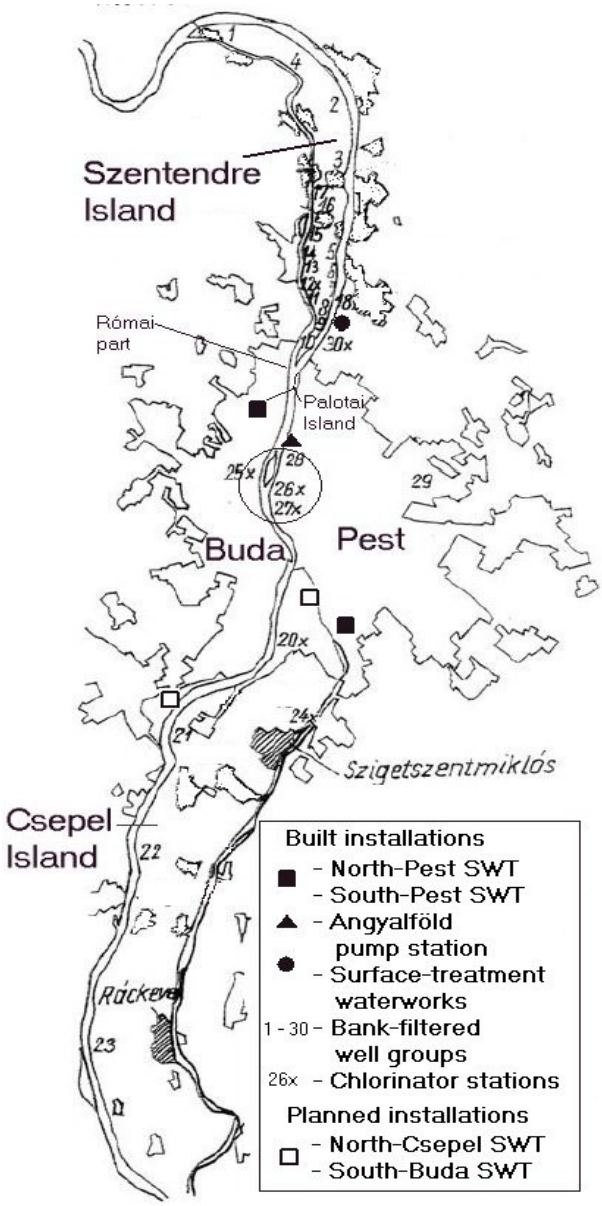
[181] Polonyi. K. (1971) “Budapest Álatalános Rendezési Terve” *Városépités,* (7) 6: p.5

insufficient advances which had been achieved in modernising Budapest's urban structure during the socialist era.

Taken at face value, the various sectoral plans which the 1970 ÁRT was an attempt to coordinate, clearly constituted a promise that the regime intended for the improvements in the lives of Budapest's citizens which had been achieved through infrastructural evelopment in the 1960s to continue. Moreover, that this would run parallell to and help facilitate a process of further modernisation and development of Budapest's industries. However, as Polonyi also emphasises in his 1971 article on the ÁRT: "At all times, the most important requirement of urban planning is flexibility."[182]

Flexibility in response to unexpectedly arising needs and problems, new political priorities, and to new economic conditions, while at the same time making sure that short term efforts contribute to the attainment of long term goals.[183] As I will elaborate on in chapter 4, such flexibility, especially in response to the availability of funds for investment in urban infrastructures would as in the 1960s dominate the process of urban development in Budapest during the 1970s and 1980s. In other words, the tension between the modernisation of Budapest and the improvement of the standard of living on the one hand, and industrial development on the other would continue to characterise urban development in Budapest.[184]

[182] Polonyi. K. (1971) "Budapest Álatalános Rendezési Terve" *Városépités,* (7) 6: p.5
[183] Polonyi. K. (1971) "Budapest Álatalános Rendezési Terve" *Városépités,* (7) 6: p.5
[184] Szelényi, I. (1996): "Cities Under Socialism – and After" in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd: p. 298



Map 3: Wells and Sewerage Works During the Socialist era (Source: Homonnay, A, (1993) "A Budapesti Ivóvíz Minösége és az azt Kialakitó Tényezök" *Hidrologiai Közlöny*, 73(3): p. 172)

3.2 Perceptions of Conflict: The Danube as Source and Sink and around 1970

As a result of the economic troubles of the 1960s all aspects of planned urban development in Budapest received less funding than projections indicated at the beginning of the decade. Despite this, FVM was able to achieve what Rácz retrospectively described as "an order of magnitude improvement" in terms of the quantity of water supplied by 1970.[185] This was a clear result of the high priority

[185] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p. 245

ascribed to water supply development, which I would argue was a part of the effort to improve the lives of Budapest's inhabitants in concrete and visible ways. Although FVM also received less funds than planned, it was still the most well funded of Budapest's utilities in the 1960s.[186] However, the change in the technological basis of FVM's production of water made to solve the quantitative limitations of bank-filtered water production resulted in novel problems with quality, as well as increased costs.

The loading of the Danube at Budapest with pollutants had continued to intensify during the 1960s. This was a result of population growth in general, as well as the increased ratio of households connected to the water supply and sewerage systems. The latter mainly in conjunction with the projects built as a part of the housing Program, to which network development was limited for the most part. The increasing importance of such polluting industrial branches like chemicals and pharmaceuticals in the 1960s also contributed significantly to the increased pollutant load.[187] Moreover, as a result of the effort to centralise wastewater discharges in preparation for the planned further development of biological treatment, an increasing ratio of industrial wastewaters were drained through the municipal network.[188]

Negative trends in the quality of the water supplied by FVM to Budapest's households and industries was one of the main reasons why the pollutant load of the Danube by the early 1970s had come to be seen as a problem. Due to the weaknesses of the technological solution chosen for the surface-waterworks, pollutants from upstream areas now for the first time had a distinctively negative impact on Budapest's water-supply. This lead to critique of the supply of surface-water for human consumption, calls for further development of the technologies used, as well as efforts to cooperate with upstream countries on pollution abatement.

Moreover, during the 1970s the aquifers on Csepel were to be developed into a more significant element of Budapest's water supply. This entailed initiating development of aquifers along the main Danube-branch. While the Ráckeve-branch was quite polluted in some respects, it still served as sink for a quite limited area. The

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[186] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p. 245 and
Gilltner, A. (1970) (ed) *Budapest Közmü és Mélyépitési Távlati Terve* (1971-1985), Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.38

[187] Barata, G. and G. Kukely (2004) "A Budapesti Ipar az Államsocializmusban és Bukása Idején" in: G. Barata (ed) *A Budapest Barnaövezet Megújulási Esélye:* Budapest: MTA Társadalomkutatóközpont: p.37

[188] Vészprémi, M. (1972) "Kétmillió köbméter szennyvíz?" *Budapest*, 10(2): p. 27

main Danube-branch, on the other hand, was the Hungarian capital's primary sink, and the stretch along Csepel was where the most intensive self-purification processes occurred. While bank-filtered wells had been operated on the basis of quite polluted raw Danube water in Budapest since the 1930s, the intensity and variety of pollutants along Csepel represented unprecedentedly adverse conditions.

Thus the main Danube branch along Csepel was to function as both source and sink for Budapest. The twin organic machines on which Budapest's advantageous water resource situation depended were thus to overlap here. Although this was also the case in the Ráckeve branch, the water quality problems encountered there during the 1950s and 1960s led FVM to consider further well development there as impractical. This despite the fact that due to the much more limited area drained by this branch the volume of wastewaters, and their diversity in terms of pollutant content, was much more limited, and thus at least in theory easier to resolve. As I will discuss below, while quality problems were not pronounced at the new well fields on Csepel in the early 1970s, nonetheless the use of the main Danube-branch a both source and sink came to be seen as incompatible in the long run, and calls for treatment of municipal and industrial wastewaters became more insistent.

The main purpose of this section will be to look at how the changing basis of Budapest's water supply affected perceptions of the Danube as a source and sink. I will start of by discussing the projections regarding the future consumption of the Danube as a source contained in the 1970 *Budapest közmü és mélyépitési távlati terve (1971-1985)* (Budapest's long term public works and deep construction plan, henceforth: Közmüterv). How these were connected to the 1970 revised ÁRT, how the rising demand for water was to be met and what reserves of undeveloped production capacities were thought to exist.

I will then move on to discuss how the increasing pollutant content of the Danube upstream and downstream of Budapest were seen as influencing the quality of Budapest's drinking-water. Finally I will look at what plans the Közmüterv contained for the utilisation of the Danube as a sink; what perception of the Danube as a sink lay beneath these plans; and how during the early 1970s, the mounting concerns over declining water quality and the ongoing establishment of wells on western Csepel caused a change in the perception of the Danube as a sink.

3.2.1 The Közmüterv 1971-1986 and the Danube as a Source:

In conjunction with the revision of the ÁRT in 1970, the long term plans for water supply were also updated. As in the early 1960s, the scope of these plans was 15 years. The projections it contained were based on the prescriptions of the ÁRT, as well as the experiences gained during the 1960s. Average daily water consumption was expected to grow by 51,7 % from 679.000 m^3/d to 1.030.000m^3/d by 1985. Peak consumption by 67,6%, from 864.927 m^3/d to 1.450.000m^3/d.[189] This would also include transfers to water-supply systems in the agglomeration of averagely 200.000 m^3/d. [190] Water for industrial purposes abstracted from the Danube either by individual industrial enterprises would come in addition. Another additional source was FVM's industrial waterworks, the ratio of which was planned to grow in the supply mix.[191]

Unlike in the 1950s in particular but also the 1960s, most of the increase in drinking-water consumption was planned to occur among household consumers.[192] To some extent this would be as a result of the increasing number of households connected to FVM's supply system. There was still much to do in this field. As K.A., an otherwise unidentified commentator stated: “If we look at how many of Budapest's inhabitants enjoy cultured water supply, rather than the former 91%, we can only speak of 81-82%.”[193] That is, while 91% had some access to water supplied by FVM, only 81-82% had individual, modern taps in their apartments.While the long term aim, as in the 1960s, was to extend the water-supply system to cover the entire city, the new intensive housing estates were the priority. 80 000 of these were to be connected to FVM's water supply system during the final five years of the first 15 year Housing Program.[194]

As significant, if not more, was the consumption growth expected as a

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[189] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: calcultations based on table V, p.35

[190] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.39

[191] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p. 43

[192] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: Calcultations based on table V, p.35

[193] K. A. (1971) “Mindenapi vizünk” *Budapest,* vol. 9(6): p.6

[194] Vinzce O. (1971) “Elörelátobb vígazdálkodás” *Budapest,* 9(11): p.5

consequence of increasing standards of living. That is, due to growing per capita water consumption caused by the rising ratio of households with individual bathrooms and other water intensive fixtures. This, what was defined as "cultured" water supply, was to be a basic feature of all new housing units, that is individual taps, as well as modern sanitary facilities, and the increased standard of living and implicit growth of per capita water consumption this entailed. This was symbolically significant in its own right.

Between 1958 and 1966, this ratio grew from 37% to 48%.[195] Most of the new bathrooms built in this period were in the new state-financed housing estates built during the first 15 year Housing Plan, and were an important element in the acceleration of household drinking-water consumption in the 1960s.[196] By 1986, after another 15 years of intensive housing development, the bathroom ratio was expected to reach 65.5%.[197]On the basis of surveys conducted in the 1960s by FVM, the authors of the Közmüterv concluded that the increasing bathroom ratio would result in a 62% increase of average per-capita daily drinking-water consumption between 1969 and 1985. That is, from 135 litres to 207 litres.[198]

Limiting the growth of industrial consumption of drinking water was even more of a priority than it had been in the 1960s. Some success had been achieved in this field during the last decade. After initial growth, it slowed down in the mid 1960s and stagnated by the end of the decade. According to the authors of the Közmüterv this was "..,presumably on the one hand due to the new water tariff policies, on the other due to the limited possibilities for industrial development in the capital."[199] The planners assumed that this trend would continue into the 1970s, and planned for 1% yearly growth "to be on the safe side"[200] Contrary to this, according to an article by a water policy specialist in *Budapest* from 1971, industrial water demand was expected

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[195] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p. 42

[196] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p. 42

[197] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p. 42

[198] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p. 43

[199] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p. 43

[200] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p. 44

to grow threefold between 1971and 1985.[201]

The assumption that despite significantly increasing needs the industrial consumption of drinking-water would not grow significantly, was primarily based on three premises. That the process of industrial decentralisation started in the 1960s would continue. That lower quality, treated surface water, supplied through the expanding separate industrial supply-system would continue to become more significant, further replacing drinking water in less demanding industries and productive processes. Moreover, that due to higher fees and stricter technical standards, industries using drinking water would focus on water conservation and recirculation.[202]

Although the area available for industrial development was to increase substantially according to the ÁRT, this was meant to facilitate reorganisation of extant productive activities, not the establishment of new ones.[203] The 1970 ÁRT emphasised that only already established industries were to be developed.[204] In order to ensure that industrial drinking water consumption did not continue to grow excessively, thus making the planned improvement of household supply more difficult, FVM was planning to increase its production of industrial water. FVM also argued for including the surface waterworks, the quality performance of which they were not satisfied with to the industrial supply system.[205]

While the expected increase in water demand was significant, on the basis of surveys conducted during the 1960s, the availability of as yet undeveloped bank-filtered aquifers were deemed copious enough to ensure sufficient water until 1985, and even as far as 2000.[206] The as yet undeveloped first-rate aquifers on Szentendre Island, that is those containing water not requiring treatment, had an estimated yield of 380 000 m^3/d. A further 150 000 m^3/d of second-rate aquifers, yielding water requiring treatment due to elevated levels of iron and manganese-ions were also

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201 Vinzce O. (1971) "Elörelátobb vígazdálkodás" *Budapest,* 9(11): p.5
202 K. A. (1971) "Mindenapi vizünk" *Budapest,* vol. 9(6): p.6
203 Barata, G. and G. Kukely (2004) "A Budapesti Ipar az Államsocializmusban és Bukása Idején" in: G. Barata (ed) *A Budapest Barnaövezet Megújulási Esélye:* Budapest: MTA Társadalomkutatóközpont: pp. 46-47
204 Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: p. 149
205 Vinzce Oszkár, "Elörelátobb vígazdálkodás", in *Budapest,* vol. XI, no11, November 1971, p.5
206 Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.38

available.[207] The Szentendre Island aquifers were earmarked for the exclusive use of Budapest, while settlements in Pest County drew water from aquifers along the mainland banks.[208]

Although the undeveloped first rate aquifers on Szentendre Island would have made further utilisation of the Csepel aquifers unnecessary until the 1985-2000 period, the development of the western (main-branch) aquifers on Csepel was still considered necessary. "For strengthening the capital's water supply system from the south," as the Közmüterv's authors emphasised.[209] This was no longer only in order to facilitate development of the southern periphery of Budapest. The Közmüterv explicitly stated that the aquifers on Csepel were to be shared between the capital and its environs and thus facilitate the broadened regional responsibility planned for the FVM.[210]

In order to achieve this the Közmüterv called for more than a doubling of water production on Csepel between 1969 and 1985, from 120 000 m^3d to 290 000 m^3d.[211] That is, from 17% of FVM's average water-production in 1969, to 28% in 1985. In total, around 1970 the total estimated yield of the exploitable Csepel aquifers was thought to be around 650 000 m^3.[212] These figures were based on estimates, as only exploratory surveys of Csepel had been conducted in the 1960s, and were thus not based on the same kind of thorough mapping of the aquifers as on Szentendre in terms of the quantity and quality of water these would yield.[213]

According to a 1972 book edited by G. Preisich's on the plans for Budapest, the main focus of drinking water production development was to occur along the main branch of the Danube on Csepel, as well as some on the Buda side of the river. Only very few wells were to be established along the Ráckeve branch on Csepel,

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[207] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.44

[208] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.44

[209] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.44

[210] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.40

[211] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.46

[212] Károly, A. (1973) "A Fővárposi Vízmüvek fejlesztése" *Budapest* 11(9): p.6

[213] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Főváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.38

although some were to be sunk far inland on the Pest side.[214] In light of the fact that the main Danube-branch along Csepel was Budapest's primary sink, the initiation of well development there must have entailed some consideration of the resilience of the bank-filtering process and the potential risks such polluted raw material might possibly cause. According to the Közmüterv, "Particular attention should be devoted to the quality of the water...".[215] Despite this, the only direct reference to the exposed position of the western Csepel aquifers was the statement that "(w)e must expect that the water abstracted here will require a certain amount of treatment."[216]

FVM was also conducting or planning several projects aimed at improving the knowledge and technical basis of water production. At the time the Közmüterv was approved in 1970, a detailed survey of Csepel's aquifers was under way in order to establish a firm hydro-geological knowledge-basis for bank-filtered water production similar to the one which already existed on Szentendre Island.[217] Development of the surface water treatment technology was also planned, despite FVM's clear dislike of this means of obtaining water.[218]

3.2.1.1 Water Quality in the early 1970s: Risks and Aesthetics

The claims regarding the declining quality of water from FVM's system of bank-filtered wells were quite dramatic. If true, it would indicate that the threshold of the bank-filtering process, its tolerance level in terms of the pollutants present in the raw Danube water was approaching, if it had not yet already been reached. The potential task of making up for this shortcoming of the organic machine of bank-filtering through additional treatment was on an entirely different scale than improving the technology of surface-water treatment, both in terms of technical and financial challenges.

That left solutions from the raw water side, in other words, somehow limiting

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[214] Preisich, G. (ed) (1972) *"Budapest Jövöje"* Budapest: Müszaki Könyvkiadó; Figure 67, p.90

[215] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.40

[216] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.38

[217] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága:Közmüterv, p.44

[218] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.39 and p.47

the impact of pollutants on the bank-filtered aquifers, which, as I will discuss below, affected the perception of the Danube as a sink at a basic level. Any solution to problems with the quality of water in the wells at Szentendre in terms of reducing the pollutant load of the Danube entailed, at least in the long run, cooperation with upstream neighbours, which presented its own set of difficulties. This however, falls outside of the main scope of this thesis. With claims of quality problems with the Szentendre wells, the ongoing establishment of wells along Csepel's western banks became a particularly contentious issue. Pollution along Csepel far exceeded that of the two Szentendre-branches of the Danube, due to the use of the former as Budapest's primary sink.

While in the 1970 Közmüterv it had been stated that "(..)a certain amount of treatment." would most likely be needed for the waters drawn from the aquifers of western Csepel, already in the early 1970s much more dramatic measures were being called for.[219] In an article in *Budapest,* the monthly magazine published by the Municipal Council, from 1971 on the problem of the mounting pollutant loading of the Danube, O. Vincze, a popular writer on water issues, emphasises the incompatibility between using the water of the river as both source and sink along Csepel in the following manner: "This [biological wastewater treatment] is extraordinarily important also because the expansion of the waterworks below the capital is only possible after the realisation of the treatment Program."[220] The KÖJÁL, Budapest's public-health office, in this instance represented by F: Gács et al., was another exponent of critical opinions of the resilience of the bank-filtering process. In a 1973 article, referring to the new western Csepel wells, they state that "..., water production and waste-water discharges are essentially realised in a short circuited (SIC) cycle along the Budapest Danube reach."[221]

In another, later article published by KÖJÁL's experts the problem is defined in more detail: "On the basis of data going back to 1940 on the Capital's drinking water, we can establish that the quality of water in the producing wells (…) has been

[219] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.38

[220] Vincze, Ó. (1971) "Civilizáció – Szennyinvázió", *Budapest,* 9(1): p.33

[221] Gács, F. et al. (1973):"A Fövárosi Vízellátásnak Egészsgügyi Vonatokzásái", in *Hidrologiai Közlöny*, 53(9-10):, p. 418

declining steadily in terms of bacteriological and chemical parameters."[222] *Budapest* also had a pronounced focus on the water management issues facing Budapest. While not wholly critical, there was some focus on the declining quality of the water supplied by FVM, mostly in terms of its aesthetic qualities. K.A.'s 1971 article is a good example of this, commenting the poor taste of the water he states that: "Some decades ago the water flowing from the taps of Pest was of world renown; since then quality has deteriorated to a large extent."[223]

FVM's own experts, on the other hand, were more moderate when discussing the problems facing the bank-filtered wells they were responsible for operating. In an article from 1974 titled "Environmental Protection and Budapest's Water-Supply" I. Bíró and G. Hajdú present FVM's perspective on the quality problems of the water they supply. In this they offer the following description of the bank-filtering process: "Repeated experiments have established that the biofilm which forms on the bed of the Danube, and consists of various bacterial colonies, ensures effective filtration of the Danube water percolating through it into the Danube-bed."[224] Moreover, based on FVM's measurements aimed at discovering how the mounting pollutant content of the Danube affects bank-filtered wells, they dismiss this with the statement: "To date, this influence is not significant."[225]

The aesthetic issues were the ones on which there was the least disagreement. Following up on the quote above, K.A. links this deterioration of quality to industrial discharges, which he claims had "fundamentally altered the river."[226] Elaborating on this issue while discussing the effects of chemical pollutants of industrial and agricultural origin, I. Bíró and G. Hajdú emphasise that these are the agents primarily responsible for the deteriorating aesthetic quality of bank-filtered water. The negative influence of oil and phenol discharges had exerted on the quality of bank-filtered water were their primary examples. Moreover they make a point of stating that these problems were of an aesthetic character, and thus not detrimental to human health.[227]

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[222] Szabó, Dr. M. (1975) "A Környezet Szennyezettségének Megállapítására Irányuló Vizsgálataink", *Budapest Közegészségügy*, 7(2): p.43

[223] K. A. (1971) "Mindenapi vizünk" *Budapest,* 11(6): p.6

[224] Bíró, I. and G. Hajdú (1974) "Környezetvédelem és Budapest Vízellátása" *Vízgazdálkodás és Környezetvédelem,* 1(4): p. 31 and 34

[225] Bíró, I. and G. Hajdú (1974) "Környezetvédelem és Budapest Vízellátása" *Vízgazdálkodás és Környezetvédelem,* 1(4): p.30

[226] K. A. (1971) "Mindenapi vizünk" *Budapest,* 11(6): p.6

[227] Bíró, I. and G. Hajdú (1974) "Környezetvédelem és Budapest Vízellátása" *Vízgazdálkodás és*

The declining micro-biological quality of water drawn from the bank-filtered aquifers in the Budapest area, also upstream of Budapest on Szentendre Island, was as mentioned cited as one of the reasons for considering the deteriorating quality of raw Danube water a public health problem.[228] In contrast, Bíró and Hajdú emphasise that the end result of the bank-filtering process is water which is "....free of organic matter, especially bacteria,..."[229] Either way, the significance of this issue was reduced already in the early 1970s. As in many other cities in Europe and Northern America at the time, improved methods of chlorination made the issue of water-borne pathogenic bacteria less relevant.[230] According to a 1993 article by Hommonay, commenting on the improvement of the bacteriological quality of the water supplied by FVM in the 1970s: "It was at this time that the safe and adequately effective chlorination system was completed, which ensured adequate disinfection from the raw water side."[231]

Above regulation levels of iron- and manganese-ion in bank-filtered aquifers in some areas was the only problem which had warranted the introduction of treatment beyond chlorination by the early to mid 1970s. Bíró and Hajdú emphasise that FVM considered this as the only serious type of quality problem detected in the water abstracted from its bank-filtered wells.[232] As mentioned above, this problem was first encountered in the wells sunk along the Ráckeve-branch in the late 1940s, and had during surveys in the 1960s also been detected on Szentendre Island. Although no comprehensive hydro-geological survey had as yet been conducted on Csepel, as I will ague in the following, the choice of developing the aquifers along the main Danube-branch was motivated by avoiding the need for drinking-water treatment.

According to I. Bíró and G. Hajdú, this quality problem was not caused by the intensified utilisation of the Danube's capacity as a sink. Rather it was due to the accumulation of organic sludge on the bed and banks of the river. At most of the

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Környezetvédelem, 1(4): p. 31 and 34

228 Gács, F. et al. (1973):"A Fővárosi Vízellátásnak Egészsgügyi Vonatokzásái", *Hidrologiai Közlöny*, 53(9-10); p. 419

229 Bíró, I. and G. Hajdú (1974) "Környezetvédelem és Budapest Vízellátása" *Vízgazdálkodás és Környezetvédelem,* 1(4): p. 31

230 Tarr, J. A. (1996) *The search for the ultimate sink : urban pollution in historical perspective*, Akron, Ohio: University of Akron Press, p. 13

231 Homonnay, A, (1993) "A Budapesti Ivóvíz Minösége és az azt Kialakitó Tényezök" *Hidrologiai Közlöny*, 73(3): p.170

232 Bíró, I. and G. Hajdú (1974) "Környezetvédelem és Budapest Vízellátása" *Vízgazdálkodás és Környezetvédelem,* 1(4): p.30

bank-filtered aquifers in the Budapest area the formation of such deposits was prevented by the rapid current of the Danube, which continuously washed the bed and banks, preventing the sludge from settling. However, where the current did not wash away the sludge, either due to the contours of the bank or to changes in the current, whether the former or the latter were due to anthropogenic interventions or not, elevated iron-manganese levels would be the result.[233] Or, as they put it themselves, "...the main problem is not a result of pollution, but rather of changing currents."[234]

As mentioned above, some industrial pollutants could affect bank-filtered wells, and discharges of toxic substances regularly forced FVM to shut down the surface-waterworks. Thus it is obvious that the water from which the bank-filtered wells on both Szentendre and Csepel produced drinking water contained varying levels of chemical substances of industrial origin, some of these toxic. Taking the main Danube-branch along Csepel's role as Budapest's main sink, also for regular and accidental industrial discharges, it is furthermore obvious that this situation must have been more prevalent there.

In fact, as I. Bíró and G. Hajdú portray it, some chemical substances of industrial origin could penetrate past the various purifying agents which make up the bank-filtering process, these were not considered detrimental to human health, only to the aesthetic quality of the water.[235] Toxic or in other ways harmful substances of industrial or agricultural origin which were known to be present in the Danube were according to FVM's water-quality specialists not able to affect the quality of bank-filtered water in any significant way. The substances which had been targeted in analyses included radioactive materials, heavy metals and cyanide.[236]

However, as I will elaborate on in chapter 4, the perceived immunity of the bank-filtering process to toxic substances might very well have to do with the prevailing understanding of toxicity, as well as the instruments and analytical methods utilised in Hungary at this time. In terms of the former, as I will also discuss

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[233] Bíró, I. and G. Hajdú (1974) "Környezetvédelem és Budapest Vízellátása" *Vízgazdálkodás és Környezetvédelem,* 1(4): p.30

[234] Bíró, I. and G. Hajdú (1974) "Környezetvédelem és Budapest Vízellátása" *Vízgazdálkodás és Környezetvédelem,* 1(4): p.31

[235] Bíró, I. and G. Hajdú (1974) "Környezetvédelem és Budapest Vízellátása" *Vízgazdálkodás és Környezetvédelem,* 1(4): p. 31, 33 and 34

[236] Bíró, I. and G. Hajdú (1974) "Környezetvédelem és Budapest Vízellátása" *Vízgazdálkodás és Környezetvédelem,* 1(4): p. 31 and 33

in chapter 4, the focus was on acute toxicity, as it had been in drinking water quality studies since their inception and still was in the rest of the developed world. This was to start changing during the course of the 1970s.

An important limitation of Bíró and Hajdú's defence of the bank-filtering process, which is what I see their article as, is that unlike those authors cited above who emphasise the current and potential problems it does not really take into consideration the new wells being sunk along the main Danube-branch downstream of Budapest. I would argue that as the development of these aquifers only began around 1970, data on the quality of water drawn from them was still most likely quite limited in 1974. At least in terms of serving as a basis for any firm conclusions about the interrelationship between the Danube's functions as source and sink in this area. However, this also goes for those arguing for the risk of this development.

The main difference is that while Bíró and Hajdú are content to limit their arguments to data from the older well fields at Szentendre, the inner city and along the Ráckeve branch, those emphasising the risks more intense pollution entailed made assumptions based on the same data. While not explicitly stated, I would argue that it is safe to assume that the logic behind such assumptions was the following: if the mounting but still relatively low level of pollution at Szentendre constituted a problem for the bank-filtering process, then the much more intense level of pollution along western Csepel would result in much greater problems, that is, much lower quality bank-filtered water. Bíró and Hajdú, on the other hand, despite emphasising the need for "preventing external pollutants from ending up in our natural waters", do not even mention the potential for conflict between using the Danube downstream of Budapest as both source and sink.[237]

Putting this aside for the moment, if one is to look at the relationship between the bank-filtering process and the quality of Danube water from the perspective presented by Bíró and Hajdú, the decision to move the focus of water production development from eastern to western Csepel seems quite logical. The influence of the various pollutants with which the Danube was loaded on the quality of water in the bank-filtered aquifers was considered insignificant. This was supported by the lack of significant quality problems with FVMs inner city wells, despite the intensified

[237] Bíró, I. and G. Hajdú (1974) "Környezetvédelem és Budapest Vízellátása" *Vízgazdálkodás és Környezetvédelem,* 1(4): p.34

utilisation of the inner city section of the Danube as a sink during the 1950s and 1960s. Thus, the only possibly relevant quality problem remaining was elevated levels of iron- and manganese-ions. Despite the lack of any detailed survey of the aquifers there, with the swift and powerful current of the main Danube-branch washing the banks, the likelihood of such problems on a similar level as along the Ráckeve-branch must have seemed small on western Csepel.

These assumptions on which the siting of the new wells was based seemed, at least initially to be well founded. Although by 1974 above regulation levels of iron-manganese had been detected in some of the new wells, the problem was not as pervasive as along the Ráckeve-branch.[238] Moreover, as I will elaborate on in more detail in chapter 4, despite the high levels of pollutants of both household and industrial origin, although of slightly lower quality than the water abstracted from the aquifers on Szentendre, in general the water from the new Csepel wells did not require any additional treatment.[239]

However, Budapest's wastewater discharges were expected to rise significantly, and while sufficiently high quality water was available around 1970, there were no guarantees that this would be so if the deterioration of the Danube's water quality along Csepel was allowed to continue unchecked. As I have discussed above, the projected 650 000m^3/d total capacity of the Csepel aquifers were considered to be the Budapest region's long term water reserves. While this to some extent was due to their convenient proximity, the relative scarcity of water in Hungary entailed that other than giving treated surface-water a far more significant role in the future, the Csepel aquifers were the only realistic option.

Thus, in order to ensure that the Budapest of the future, as outlined in the 1970 ÁRT, would have enough water, a conscious choice was made enter into a situation which might entail considerable risk in terms of the quality of the water supplied. While there was disagreement over whether or not the further extension of water production on Csepel would entail significant risks, as I will emphasise in the

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[238] Bíró, I. and G. Hajdú (1974) "Környezetvédelem és Budapest Vízellátása" *Vízgazdálkodás és Környezetvédelem,* 1(4): p.30

[239] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: pp. 246-247 and
sernyászki, L. and Cs. Várzegi (1993) "A Fövárosi Vízmüvek Víztermelö Rendszerének Kialakitása, Üzemeltetése" *Hidrologiai Közlöny*, 73(3): p. 133

remainder of this chapter, this possibility was nonetheless taken seriously by decision-makers around 1970. I would argue that the following description made of the situation by Rácz's in 1976 was characteristic of how the situation was perceived by central decision-makers:

> "whether we look at it from the perspective of the surface-waterworks built since then, or the perspective of the gravel terrace along the Danube, the pollution of the Danube has become critical in terms of protecting the quality of the capital's drinking-water (this danger is intensified with the expansion of water abstraction to Csepel)"[240]

3.2.2 The Danube as a Sink Around 1970: Spatial Management, Dilution and Self-Purification

The perception of the Danube at Budapest as a sink also changed significantly during the period from the late 1960s to the mid 1970s. As concerns over the negative effects of the mounting pollutant load of the Danube had on the quality of the bank-filtered water supply came to the fore, and the source and sink functions of the Danube became increasingly intertwined, the limit of the river's capacity as a sink was re-evaluated. In effect, the perceived limits of the river's capacity for neutralising and removing urban and industrial wastes came to be seen as relative. While the interrelationship between the Danube's roles as sink and source are the focus of this thesis, other uses and functions of the Danube were also expected to be influenced by the projected intensification of Budapest's wastewater discharges.

In the early 1970s, around 900 000 m^3/d mixed industrial and household wastewaters were discharged through Budapest's sewerage system. An additional 300 000-600 000 m^3/d was discharged directly into the Danube by industrial enterprises.[241] The creeks, which had their confluence with the Danube in Budapest, also carried significant volumes of mixed wastewaters from the settlements bordering on Budapest.[242] By 1985 it was estimated that the daily volume of discharges would reach as much as 2 million m^3/d.[243]

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[240] Rácz, T. et al. (1976) "A Budapesti Szennyvízelvezetési és Tisztitási Program Megvalósulása" *Hidrologiai Közlöny*, 56(5): p. 191

[241] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.17

[242] Bulkaí, P. and T. Rácz (1970): "Budapest Környéki Településgyürü Vízellátása és Szennyvízhelyezse" *Hidrologiai Közlöny* 50 (8): p. 247

[243] Vészprémi, M. (1972) "Kétmillió köbméter szennyvíz?" *Budapest*, 10(2): p.26

According to M. Vészprémi, this would entail that "in 1985 every fiftieth litre of water in the Danube – will be wastewater."[244] Although there had been a growing focus on the risks represented by various industrial chemicals during the 1960s, the focus around 1970 still seems to have dictated by the paradigm of sink utilisation which had emerged in the early 20th century. As immediately after WWII, measurements and trends of water chemistry, bacteria counts and biological oxygen demand made up most of the quantified pollution data on the basis of which the level of loading and capacity of the Danube as a sink was evaluated.[245]

In terms of the biodegradable pollutants which sanitary engineers during the era of the "self-purification" paradigm were most concerned with, and in isolation from potentially conflicting uses, the Danube's capacity as a sink was still seen as copious. As A. Giltner puts it "the wastewater discharge situation of Budapest must be seen as advantageous."[246] According to E. Juhász and T. Rácz, even under minimum flow conditions, the large volume of water in the Danube would "entail a favourable dilution ratio" for the total wastewater yield of the entire Budapest region in 1985.[247] Or in other words, seen from this limited perspective, there was still a long way to go, both in terms of time and loading with pollutants until the limit of Danube's capacity as a sink would be reached.

All the while, the concern over industrial wastewaters had kept growing during the 1960s, in step with the ever more obvious environmental impact of this waste. Even if quantified data was not presented, most articles and plans regarding Budapest's water management did mention the increasingly industrial character of the wastewater discharged into the Danube. As T. Garami et al. remark in their 1972 history of Budapest's sewerage: "the ratio between household and industrial wastewaters in the capital has changed, and the industrial wastewaters also contain several substances which are difficult to break down or are toxic for the life world (sic) of the river."[248]

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244 Vészprémi, M. (1972) "Kétmillió köbméter szennyvíz?" *Budapest*, 10(2) p.26

245 Egri, I (1973) "A Főváros Csatornázása" in *Hidrologiai Közlöny*, 53(9-10): p. 389 and Vincze, Ó. (1971) "Civilizáció – Szennyinvázió" *Budapest,* 9(1): p. 33

246 Giltner, A. (1973) "Környezetvédelem-Vízvédelem" *Budapest*, 11(5): p.1

247 Endre, J and T. Rácz (1971) "Budapest Környéki Település-Gyürü Vízellátása és Szennyvízelhelyezse: Szennyvizelhelyezés" *Hidrologia Közlöny*, 51(6): p.250

248 Garami, T. et al. (1972) *Pest Város 1847. évi Csatornázási Szabályrendeletének 125 éves Évfordulója*, Budapest: Mezőgazdasági Könyvkiadó: p. 375

The increasing load of such substances caused the definition of how effluents affected the Danube's capacity as a sink to change, as M. Vészprémi points out "Today (...) it is not the growing scale of waste water, but its changed composition which is the big problem."[249] As I see it, this indicates the beginnings of a departure from the established notions of the Danube's capacity as a sink. Moreover, industrial pollutants were also seen as reducing the capacity of the river in new ways, by inhibiting the metabolic processes involved in the self-purification process.[250]

The emphasis on the negative effects of upstream utilisation of the Danube as a sink was also growing. As E. Juhász and T. Rácz describe it: "The water-pollution starts in western Germany, continues in Austria and Czechoslovakia, as well as the Hungarian bank side settlements, but mainly factories all contribute to the fact that the Danube arrives polluted above Budapest." And they go on to state that this "..reduces the self-purifying ability of the stream."[251] Although this increased concern was to a large extent the result of intensification of upstream uses of the Danube and its tributaries as sinks, it was also a result of the introduction of surface-water treatment as a part of Budapest's water supply. This made these discharges relevant and threatening on a new level.

However, it was not primarily these factors, the increasingly industrial character of Budapest's own wastewater discharges and upstream utilisation of the Danube as a sink, which led to a reconsideration of the capacity of the Danube at Budapest to neutralise wastes. The setting of new limits on how intensively the river could be utilised as a sink was rather due to the growing intertwinement of the source and sink functions utilised by the Hungarian Capital. As I have elaborated in chapter 2, source and sink functions were until the mid 20th century mostly separated. This had allowed the capacity of the Danube as a sink to be managed in practice as if this use was isolated from other uses. Thus, at least downstream of the city, where planners in the 1970s still aimed at directing most of Budapest's practically untreated wastewaters, only those properties of the river defined as part of the self-purification process were relevant when the limit of the river's capacity as a sink was to be

[249] Vészprémi, M. (1972) "Kétmillió Köbméter Szennyvíz?" *Budapest*, 10(2): p.26
[250] Endre, J and T. Rácz (1971) "Budapest Környéki Település-Gyürü Vízellátása és Szennyvízelhelyezse: Szennyvizelhelyezés" *Hidrologia Közlöny*, 51(6): p.250
[251] Endre, J and T. Rácz (1971) "Budapest Környéki Település-Gyürü Vízellátása és Szennyvízelhelyezse: Szennyvizelhelyezés" *Hidrologia Közlöny*, 51(6): p250

determined.

Although the spatial separation had not been complete since the 1930s, when the Angyalföld pump-house had been built, the concentration of pollutants in the Danube had remained relatively low, a result of its copious volume of water for dilution. This had ensured that the bank-filtered wells in the inner city, as well as various recreational functions had not been degraded significantly. While this was so, the goal of spatial separation had still been present in sewerage plans and was still so in 1970, in tune with the goal of early 20th century sanitary engineering of preventing the utilisation of bodies of water as sinks through spatial separation.

Since the 1930s the plan for achieving this had revolved around treatment at Angylaföld and the construction of the remaining bankside intercepting sewers on the Buda side. As I see it, the fact that these plans had not been implemented by 1970, while of course a matter of cost, was also due to just this: there were no significant uses which dictated that the inner city Danube should not also be used as a sink.

However, as I would argue the 1962 declaration of principle regarding the long term goal of treating all of Budapest's wastewater biologically indicated, this situation was not expected to last indefinitely. The increasingly intense pollution caused by Budapest's discharges of wastewater was at some point expected to come into conflict with other uses of the river considered as important by the regime as well as the populace. In order to prevent the loading of the Danube's capacity as a sink to reach this level, treatment of household and industrial wastewaters would need to be implemented. However, this point was by policy makers and the experts providing the basis for decision making considered to have been reached in 1962, and as I have indicated above, by some not even in the early 1970s.

FCSM, as the agency primarily responsible for overseeing aquatic pollution in Budapest, had since 1957 been conducting increasingly thorough tests of the Danube above and below Budapest.[252] According to Garami et al., one of the goals of these tests was to determine when the pollutant loading of the river reached the level where the construction of biological wastewater treatment facilities became necessary. Or as they put it themselves: “On the basis of continuous tests we can determine the limit, at which the water of the Danube can still be used for these purposes, respectively we

[252] Garami, T. et al. (1972) *Pest Város 1847. évi Csatornázási Szabályrendeletének 125 éves Évfordulója*, Budapest: Mezőgazdasági Könyvkiadó: p. 374

can make a decision about when, in which order and with what level of pollutant removal the extraordinarily expensive installations for the treatment of the capital's wastewater should be built."[253]

"These purposes", in this context, is stated as being the production of sufficiently high quality bank-filtered and industrial water, as well as the use of the Danube for recreational purposes. In other words, the need for treatment was defined by the effect the use of the Danube as a sink had on other functions the river fulfilled. [254] Although Garami et al. in their book indicate that they do not yet consider the point where treatment was necessary to have been reached yet, by the early 1970s others were already arguing for this. According to an article by Ó Vincze in *Budapest* from 1971 "... the saturation of the river's waters is already approaching the critical limit,...".[255]

As I see it, although the by now relatively intense level of pollution and expectations for it to increase further were an important part of why this "critical limit" was seen as approaching, the technological and spatial changes in FVM's water production were at least as important. While the Danube's capacity for dilution and self-purification were unchanged, still as copious and advantageous as in the past, the new circumstances of drinking-water production entailed that new water-quality requirements came into effect. In effect this imposed new limits on the utilisation of the resource the Danube's sink capacity was perceived as by water quality experts.

The first of these new limitations of the Danube's function as a sink to receive attention was a result of the sensitivity of the surface-waterworks to the Danube's water quality. This entailed limiting the loading of the Vác Danube-branch, from which both the surface-waterworks drew their water. According to the 1970 Közmüterv, even the volume of biologically treated household wastewater discharged into this Danube-branch had to be limited, and industrial discharges were out of the question. The Közmüterv contained plans for the redirection of wastewaters which would otherwise have been discharged along this section of the Danube through

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253 Garami, T. et al. (1972) *Pest Város 1847. évi Csatornázási Szabályrendeletének 125 éves Évfordulója*, Budapest: Mezőgazdasági Könyvkiadó: p. 375

254 Garami, T. et al. (1972) *Pest Város 1847. évi Csatornázási Szabályrendeletének 125 éves Évfordulója*, Budapest: Mezőgazdasági Könyvkiadó: p. 375

255 Vincze, Ó. (1971) "Civilizáció – Szennyinvázió" *Budapest,* 9(1): p. 33

intercepting sewers to the Angyalföld pump station, further downstream.[256]

In contrast, while some mention was made of the bank-filtered aquifers on Szentendre Island in this section of the Közmüterv, the bank-filtering process was considered capable of dealing with the level of pollution in the two branches of the Danube flowing along Szentendre Island. Thus, as in the past this part of FVM's water production system was not seen as placing limits on the capacity of the Danube as a sink. However, the lack of modern sewerage on parts of Szentedre Island and the resulting use of the island's soils as a sink was seen as problematic, and a separate plan was in the making to deal with this. The extant well-fields on Csepel's eastern shores were not mentioned, nor were the planned well-fields on Csepel's western shore.[257]

On the basis of this, it would seem like that when the 1970 Közmüterv was drawn up in the late 1960s, the raw water quality requirements of the bank-filtering process was not considered as affecting the "critical limit" of the Danube's capacity as a sink. This was not exceptional when applied to the upstream branches along Szentendre Island, which enjoyed some of the highest water quality of the Hungarian Danube around 1970.[258] Below Budapest, however, both the main Danube-branch and the Ráckeve-branch suffered from pollution problems. In fact, the main branch was on the completely opposite end of the spectrum as the two Szentendre branches. Due to the integration of its self-purifying capacities into Budapest's industrial and municipal waste disposal systems it had the dubious privilege of being the most polluted section of the Hungarian Danube in 1970 in terms of most categories.[259]

By the time the 1970 Közmüterv was published, the ongoing development of bank-filtered water production along Cseple's western shore was already causing new limits to be imposed on the Danube's capacity as a sink. Although the development of these aquifers proceeded according to plan and their water was of acceptable quality, as I have argued above there was concern that the projected doubling of Budapest's

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[256] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.79

[257] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.79

[258] Csanády, M. (1994) "A Duna Vízminösgének Higiénés Értékelése" in *Hidrologiai Közlöny*, 74(5): figure 1-6, pp. 294-295

[259] Csanády, M. (1994) "A Duna Vízminösgének Higiénés Értékelése" in *Hidrologiai Közlöny*, 74(5): figure 1-6, pp. 294-295

wastewater discharges would exceed the bank-filtering process' capabilities for removing pollutants. Thus the long-term viability of water production along this stretch of the Danube came to be considered as contingent on if not reduction, then at least no further intensification of the strain on the river's capacities as a sink.[260]

3.3 Socialism and The Environment

As I have discussed in the Introductory chapter, in the 1980s, the period leading up to the collapse of the socialist system, as well as during the following transitional phase in the 1990s, the socialist system in general, and also in Hungary in particular, was described as environmentally malign. That is, unlike what the socialist regimes had claimed, that making socialism environmentally benign was matter of adjustment and reform, internal and external critics claimed that the socialist system was intrinsically bad for the environment.

The main thrust of this argument is that the socialist regimes of ECE exposed the populace as well as the ecological integrity of the environment to risks and harm. At first glance the plan to utilise the Danube below Budapest as both source and sink, might seem like a good example of this. However, as I have emphasised above, the concern over the potential for degradation of the quality of water drawn from the wells on western Csepel in the future demonstrated that the actors involved in the management of the Danube's source and sink functions took a precautionary approach. As I will discuss below, plans for preventing the pollutant loading of the Danube from reaching were already being elaborated and were approved in 1974.

On the basis of this I would argue that the plans for utilising the Danube as both source and sink below Budapest did not disregard the risks this implied. Rather, these plans should be seen in the context of the Hungarian model of planned environmental management being implemented in the early 1970s. Hungary's, as well as other ECE socialist countries' growing focus on environmental protection was accompanied by a rhetoric portraying the socialist system as better suited than the capitalist one to avoid serious environmental degradation. These assertions were based on many of the same arguments regarding the functioning of the socialist socio-economic system as its purported advantages in terms of urban development, as I

[260] Vincze, Ó. (1971) “Civilizáció – Szennyinvázió” *Budapest,* 9(1): p.33

have described these in chapter 2.

In the 1974 book *Environmental Deterioration in the Soviet Union and in Eastern Europe,* the editor, I. Szelényi describes these advantages on a general level for socialist ECE. He emphasises that late development gave socialist regimes the opportunity to learn from past environmental mistakes in the West. Moreover, that the socialist central governments, due to their strong, centralised control over industrial policy, were able to insist on environmentally benign practices to a much greater extent than their western counterparts.[261] Although Szelényi does not mention this, based on my discussion of state control over urban planning and development, I would argue that it is clear that the potential of socialist governments to insist on environmentally benign also applies here.

In an article originally published in Hungary in the late 1960s, G. Enyédi, whom I have cited extensively in his capacity as an urban sociologist in chapter 2, made an early foray into Hungarian environmental sociology, in which he described these theoretical advantages in the following manner:

> "Among specialists it frequently has been stated that Hungary's late industrialization and urbanisation gave us a better chance to deal with the relationship between society and nature. In addition, it has been presumed that the natural environment in Hungary is less harmed than those of West European countries that industrialized centuries before Hungary did. Further, in Hungary the concentrated industrial-urban damage is occurring in a period when the technical means to prevent deterioration are well developed and when socialist planning methods give an opportunity for the organization of our entire society against pollution."[262]

However, he goes on to say that "(i)t should be mentioned, however, that the potential advantage of socialist planning [in protecting the environment] can only be realised if we can fit into the planning system the relationship between man and nature."[263] In other words, environmental protection had to be made an integral part of

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[261] Völgyes, I (1974) "Pollitics and Pollution in Western and Communist Societies" in: I. Völgyes (ed) *Environmental Deterioration in the Soviet Union and in Eastern Europe,* New York: Praeger Publishers: pp. 4-5

[262] Enyédi, G. (1974) "Chp 7: Planning for the Purposeful Use of the Environment: A Hungarian Viewpoint" in: I. Völgyes (ed) *Environmental Deterioration in the Soviet Union and in Eastern Europe,* New York: Praeger Publishers: pp.124-125

[263] Enyédi, G. (1974) "Chp 7: Planning for the Purposeful Use of the Environment: A Hungarian Viewpoint"

the decision-making and redistribution processes of the plan economy. He goes on to contrast environmental protection with this model of environmental planning he proposes. The former he defines as defensive, as a response to environmental deterioration. Conservation, defined in Hungary as protection of wildlife, habitats and landscapes, was according to Énvédi seen by some as the solution, was as he saw it only a small part of "the proper use of the environment" which he defined as the goal of socialist environmental planning.[264]

Describing the latter, he stated that "(t)he proper use of the environment is an active, planned process..."[265] This "planned process" is to be based on knowledge about the "..processes in the natural environment that take place as a result of the alterations of the societal sphere."[266] Balance was then to be ensured between these ".. natural and societal processes.." through employing the means of economic planning. [267] Thus, compared with what Enyédi sees as necessary for realising the potential of the socialist system as an environmental benign social order and avoiding the kind of environmental degradation experienced earlier in the west, he sees the early environmental measures implemented in the 1960s as inadequate.[268]

Although Enyédi clearly states that he does not consider conservation as a sufficient basis of socialist environmental management, his proposed model still seems to have much of the late 19th, early 20th century conservation approach in it. This is most obvious in Enydi's strong resource focus in environmental management and his emphasis on scientifically based rational management of these. I base this comparison on Keeling's characterisation of early 20th sanitary engineering as based

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in: I. Völgyes (ed) *Environmental Deterioration in the Soviet Union and in Eastern Europe,* New York: Praeger Publishers: p.125

264 Enyédi, G. (1974) "Chp 7: Planning for the Purposeful Use of the Environment: A Hungarian Viewpoint" in: I. Völgyes (ed) *Environmental Deterioration in the Soviet Union and in Eastern Europe,* New York: Praeger Publishers: p.127

265 Enyédi, G. (1974) "Chp 7: Planning for the Purposeful Use of the Environment: A Hungarian Viewpoint" in: I. Völgyes (ed) *Environmental Deterioration in the Soviet Union and in Eastern Europe,* New York: Praeger Publishers: p.127

266 Enyédi, G. (1974) "Chp 7: Planning for the Purposeful Use of the Environment: A Hungarian Viewpoint" in: I. Völgyes (ed) *Environmental Deterioration in the Soviet Union and in Eastern Europe,* New York: Praeger Publishers: p.127

267 Enyédi, G. (1974) "Chp 7: Planning for the Purposeful Use of the Environment: A Hungarian Viewpoint" in: I. Völgyes (ed) *Environmental Deterioration in the Soviet Union and in Eastern Europe,* New York: Praeger Publishers: p.127

268 Enyédi, G. (1974) "Chp 7: Planning for the Purposeful Use of the Environment: A Hungarian Viewpoint" in: I. Völgyes (ed) *Environmental Deterioration in the Soviet Union and in Eastern Europe,* New York: Praeger Publishers: pp.127-128

on 19th century conservationist principles in his article on the Fraser river in Canada.[269] Moreover, I would argue that the plans for Budapest's water management can be seen as an early example of such environmental planning, foreshadowing attempts at broader introduction of this model later in the 1970s.

As mentioned above, the Hungarian regime had begun implementing environmental measures already in the late 1950s. Most of these were aimed at regulating the pollutant content of emissions. Protection of water resources was an important field, and in 1964 the wastewater fine and the Water Law which was to be the basic act regulating the use of aquatic resources during the socialist era were introduced.[270] According to G. Enyédi and V. Zentai, during the course the 1960s discrete regulatory acts evolved into an "...overall policy for environmental protection..".[271]

However, it was during the 1970s that the institutionalisation of Hungarian environmental protection really began. The fact that this happened at this point was due to the attention this was receiving globally at the time, with the 1972 Stockholm Conference, as well as due to the improving economic conditions in Hungary in the late 1960s and early 1970s. As Enyédi and Zentai put it: "This was the first time that the rapid economic development was restricted by the environment, above all by the scarcity of water. And also for the first time, the rise in the living standard enabled the government to extended its Programme from the increase of consumption to the improvement of the quality of life."[272] In other words the initial success of the process building up to and including the NEM made plans for improved environmental protection realistic.

The 1972 revision of the Hungarian constitution included "..protection of the right to human life and health..", was intended by the regime to be interpreted as including the right to a healthy environment.[273] This was made more concrete through

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[269] Keeling, A. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" *Urban History Review/Revue d'histoire urbaine* 34(1): 66-67

[270] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 215 and 226

[271] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham:, p. 215

[272] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 215

[273] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 215

a series of more detailed acts, which in 1976 culminated with the *Act on the Protection of the Human Environment,* which I will discuss in more detail in chapter 4.[274] The early 1970's also saw some institutional development. In 1974 The National Council for Environmental Protection was founded. As a body directly under the Council of Ministers, its functions were primarily limited to coordination and advisement.[275] In terms of enforcement of sewerage and wastewater regulations, this was overseen by OVH (National Water Authority), while compliance with the sewerage regulations were enforced by the local sewerage operator, in Budapest the FCSM.

3.3.1 Plans For Sewerage

Between 1962 and 1974 plans regarding the issue of biological wastewater treatment developed from the quite loose and preparatory state of the 1962 Keretterv to the concrete, scheduled format of the 1974 Program. The planned development of the advantageous water resource situation afforded Budapest by its specific situation along the Danube an important part of this. As I have elaborated in this chapter, the long term, precautionary perspective taken in the development of the Danube's source and sink functions, especially in relation to their potential for becoming competitive immediately downstream of Budapest was presented as an important reason for implementing biological wastewater treatment around 1970.

However, as I will discuss in this sub-chapter, this precautionary approach was as much a result of national level legislative efforts, as of the work of local water managers in Budapest, if not more so. Moreover, as the focus on preserving and improving the water quality of the Ráckeve-branch in the 1950s and 1960s had shown, protecting the recreational functions of the Danube was also a priority. This was to have a decisive influence on the phasing of the Program, in terms of affecting in which areas it was perceived as most important to institute treatment. Nonetheless, as I see it, the Program was an attempt at pre-empting one function of the river, the utilisation of its hydrological properties and life processes, or in other words, its capacity for self-purification, from competing with other important, less easily

[274] Enyedi, G and V. Zentai (1987) “The Hungarian Peoples Republic”, in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: 216-217

[275] Enyedi, G and V. Zentai (1987) “The Hungarian Peoples Republic”, in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 217

replaceable uses.

3.3.2 The Keretterv

As I mentioned in chapter 2, the 1962 Keretterv was based around a declaration of intent, that in the long run all the dry-weather wastewaters of Budapest were to be treated biologically prior to discharge into the Danube. In terms of concrete measures, the Keretterv was primarily facilitatory. Centralisation and further development of the sewerage collection network was to lay the basis for as expedient implementation as possible. As discussed in the previous sub-chapter, FCSM intensified monitoring of point sources and their impact on the quality of the Danube's water during the 1960s, and this was among other things intended to inform decision-makers

However, this entailed that the decision-makers and experts behind the Keretterv had to decide on several significant principal issues. The most obvious of these was the siting and size of the STWs to be built in the future, which would also determine the manner in which the collection network was to be centralised and developed. Another important issue was scaling, both in relation to the estimated wastewater load to be treated overall and at each individual plant. Arriving at the first part entailed estimating the dry-weather load which would have to be treated, and deciding on the principal question of whether or not storm-waters were to be treated.

The first issue was a matter of estimating the future volumes of water discharged by households and industrial works into the sewers, in other words, as good as identical to projections of water consumption. As mentioned above, in the long term it was expected that Budapest's households, industries and institutions would generate around 2 million m^3/d wastewater.[276]

The second came down to a combination cost and the perceived great capacity of the Danube as a sink. As in all other cities with combined sewerage systems, precipitation events in Budapest increased the volume of water collected. By washing away dust pollution from streets and roofs and settled sludge from the network, the increased volume of water also carried a heightened load of pollutants. The discussion over what ratio of the diluted wastewater should be treated biologically

[276] Rácz, T. et al. (1976)"A Budapesti Szennyvízelvezetési és Tisztitási Program Megvalósulása" *Hidrologiai Közlöny*, 56 (5): p. 193

was informed by foreign expert literature. In general, the experts promoted the idea of scaling treatment capacity after expected stormwater loads.[277]

Such a solution, however, was considered far to expensive in the case of Budapest, Rácz et al. put it: "It is easy to see that – with 1 million m3/d (in the long term 2 million m3/d) Budapest wastewaters as a basis – multiplying this would incur a practically unrealistic economic demand."[278] Rather, the policy this discussion resulted in was to act as if the combined system was a separated system. Pump stations were to be scaled to discharge three times dry-weather volume into main streamline of the Danube, volumes in excess of this to be discharged through bankside stormwater outlets. This was justified with reference to the large volume of the Danube, that is its large capacity as a sink. As Rácz et al. put in 1976, "This decision was made possible by the presence of the minimum 600-800 m^3/second discharge of the Danube...".[279]

Regarding the decision on how many STWs were to be built and their individual capacities the focus on efficiency which as mentioned came to be a decisive factor in settlement development in Hungary in the 1960s. As the public works planners and sanitary engineers behind the 1970 Közmüterv put it:

> "In terms of deciding on the siting and number of installations, the general principle was established that in the interest of economical construction and operation few and large installations should be built if possible, but that it should still be possible to fulfil needs arising at different times and with different urgency/priority."[280]

On the basis of this four STWs were planned in addition to the South-Pest facility already under construction. Two smaller ones and one large. The two smaller at Angyalföld in the north and Nagytétény in the south, to treat the wastewaters of the north-eastern and south-eastern districts respectively. The large facility, to be built on the northern tip of Csepel, intended to treat the wastewaters of the central districts on

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[277] Rácz, T. et al. (1976)"A Budapesti Szennyvízelvezetési és Tisztitási Program Megvalósulása" *Hidrologiai Közlöny*, 56 (5): pp.192-193

[278] Rácz, T. et al. (1976)"A Budapesti Szennyvízelvezetési és Tisztitási Program Megvalósulása" *Hidrologiai Közlöny*, 56 (5): pp.192-193

[279] Rácz, T. et al. (1976)"A Budapesti Szennyvízelvezetési és Tisztitási Program Megvalósulása" *Hidrologiai Közlöny*, 56 (5): pp.192-193

[280] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.83

both sides of the river, as well as the north-western districts.[281]

3.3.3 From The 1964 Water Act to the 1974 Program

The mounting problems with aquatic pollution in Hungary, to which the Keretterv was a local response in Budapest, also elicited a response at the national level, of a legislative nature; the 1964 Water Act. The regulations, fees and fines as well as other measures instituted by this Act were intended to prevent aquatic pollution from becoming a serious problem in Hungary. Between 1968 and 1971 the OVH and KNEB (The Central Committee for People's Monitoring) investigated how the implementation of the Act's clauses was progressing. They "(e)stablished that there had been no significant improvements in the field of water protection."[282]

As a result of these findings, the council of ministers issued a decree on water quality protection in 1972. This concerned areas designated as of "..accentuated significance .." for water quality protection, and prescribed that: "..Programmes for the refurbishment of the wastewater treatment plants of industrial works and settlements and the construction of lacking installations were to be elaborated."[283] The Budapest section of the Danube was designated as such an area. And while the Keretterv constituted a plan of sorts for how treatment was to be resolved, it did not fulfil the new criteria set by the Council of Ministers' decree in terms of detailed and concrete scheduling.

Taking the volume of wastewater generated in Budapest and the state of sewerage collection and treatment in 1971, the drawing up of any kind of immediate realistic action plan for the treatment of municipal and industrial effluents was a daunting task.[284] Although there were several biological STWs in operation in Budapest, the only significant one was the 30 000 m3/d capacity South-Pest works. Completed in 1966, this was the first larger biological STW built in Hungary, and thus served as a "school" for the planning, construction and operation of such

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[281] Rácz, T. et al. (1976)"A Budapesti Szennyvízelvezetési és Tisztitási Program Megvalósulása" *Hidrologiai Közlöny*, 56 (5): p.192

[282] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.15

[283] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.15

[284] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.15

facilities.[285] The other STWs in operation were small-scale, temporary installations built in order to prevent local water quality problems.[286]

Primarily due to the scale of what needed to be done, unlike in smaller settlements FCSM and the Municipal Council had no way of financing this from local sources. In fact, any meaningful plan would require guarantees of a sizeable, long term investment Programme based on central government funds. [287] Thus, when the elaboration of the Program for the collection and treatment of Budapest's wastewaters began in the early 1970s at OVH's behest, this was with guarantees of additional funding from central as well as local and water management sources.[288]

There were three main goals guiding the process of drawing up the Program. These were; determining the requisite tasks in the fields of environmental and water protection; creating a draft plan which upon completion would ensure compliance with the water quality targets prescribed in the regulations; and making a detailed schedule for the individual phases of the project.[289] In addition, several other principles lay at the base of the elaboration process. Most significantly that:

> "- the carrying capacity of the capital's and national economy are to be taken into account in the elaboration of the Program."; and that "The Program does not deal with the treatment of industrial wastewaters within industrial works. It assumes that the treatment of industrial wastewaters will be implemented simultaneously, in compliance with the prescribed standards."[290]

In other words, the scheduled projects were not to be too ambitious in terms of neither technical specifications nor pace of implementation. Furthermore, despite the intrinsic relevance of the quality and volume of industrial wastewaters discharged into the public sewers, as well as into the Danube, industrial wastewater treatment was to be left outside the project.

The former was instrumental in determining the level of treatment the STWs

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[285] Rácz, T. et al. (1976)"A Budapesti Szennyvízelvezetési és Tisztitási Program Megvalósulása" *Hidrologiai Közlöny*, 56 (5): p.191

[286] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p. 251

[287] Vészprémi, M. (1972) "Kétmillió köbméter szennyvíz?" *Budapest*, 10(2): p.27

[288] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.25

[289] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.15

[290] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.15

were to be designed to achieve. The fact that the 1964 Water Act was passed after the KERTERV had been approved was also important in this context. As Mattyasovszky et al. decribe it: "Thus, after the law was passed, on the basis of the condition and loading of the recipient freshwater body as well as the pollutant content and volume of the wastewater it was possible to determine the requisite level of treatment."[291]

In terms of siting, only one significant change was made from the Keretterv. Due to plans in the 1970 ÁRT for building high-density housing estates on greenfield sites in the northern districts of the city, the projections regarding how much wastewater would be generated and thus treated in the northern districts had to be raised. This demanded a larger site than the one set aside at Angyalföld, where development during the 1960s had limited the possibilities for using more land. Thus, after discussions about alternative sites, the choice fell on the Palotai Island, a bit further north than the original site at Angyalföld.[292]

The decision to go ahead with intensive housing development on both sides of the river in the northern districts was also an important factor when the schedule of the Program was to be determined. As Rácz et al. recounted it in 1976: "The Capital Council agreed entirely with the water and health authorities: it is impermissible to let several tens of thousands m^3/d concentrated household wastewater to end up untreated in the Danube between the Roman Bank and Újpest."[293] Moreover, based on monitoring of the wastewaters of north-pest, especially those of the Angyalföld pump-house, these were considered "... as the most harmful for the Danube." by FCSM due to the concentration of industries discharging toxic wastewaters there.[294]

The concern over further intensification of the northern pollutant load was according to M. Rácz due to "..,the adjacent water production and recreational areas...", on the Margit Island and the Roman Bank respectively.[295] The Roman bank was also mentioned in the 1970 Közmüterv as an area warranting added protection.[296]

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[291] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.18

[292] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.18

[293] Rácz, T. et al. (1976)"A Budapesti Szennyvízelvezetési és Tisztitási Program Megvalósulása" *Hidrologiai Közlöny*, 56 (5): p. 193

[294] T, Garami, dr. J. Göbel, Z. Párnay, *Pest Város 1847. évi csatornázási szabályrendeletének 125 éves évfordulója*, Mezőgazdasági Könyvkiadó, Budapest, 1972,p. 380

[295] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p. 251

[296] Közmüterv 1970

All in all, these factors resulted in assigning highest priority to the Palotai Island STW. The final capacity of this facility was to be 550 000 m3/d.[297] The biological treatment units were to be completed in two stages. The first 140 000 m^3/d by 1985, including the necessary reconstruction of the collection system, and the remaining 410 000 m^3/d treatment capacity by 1995.[298]

The next objective on the schedule was the smallest, the South-Buda STW, to have a capacity of 132.000 m^3/d and to be completed by 1989. This facility was to treat the wastewaters of the two southernmost Buda side districts, as well as Csepel.[299] The capacity of the South-Pest STW, already overloaded by the mid 1970s, was to be expanded from 30.000 to 72 000 m^3/d.[300] The final, and largest step in the Program was the construction of the North- Csepel STW, to treat an astounding 1,2 million m^3/d from central Pest and Buda, as well as south-Pest, this facility was to be completed by 1995.[301] The Csepel STW was also to treat the wastewaters until 1995 treated at the South-Pest STW. The capacity of this latter STW was to be used for preventing even diluted wastewaters and stormwaters from flowing into the Ráckeve-branch, by now seen as not suitable as recipient even for treated wastewater.[302]

Aside from central Pest, all areas required significant reconstruction of their collection systems.[303] The most significant work to be done was on the Buda side. Northern Buda required significant work, and so did southern Buda, but most of the work was to be carried out in the central parts. According to Mattyasovszky et al. "(t)he preconditions of wastewater treatment are entirely non-existent here.".[304] The most significant shortcoming was the lack of the bankside collection sewer on the Buda side, which had been part of all sewer plans since Bazalgette's original plans

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297 Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.18

298 Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.26

299 Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.27

300 Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p. 251

301 Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.27

302 Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.18

303 Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: pp. 26-27

304 Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p. 26

from the 1880s. As a direct result of this six larger open drains were in operation in central Buda in 1970.[305] New interceptors were needed also in the northern districts, on both sides of the river, and in 1974 the FCSM was already in the process of eliminating the final open drain along the Rávkeve-branch.[306] These requisite network development tasks constituted more than half of the total projected cost of implementing the Program.

The Program represented a massive leap in the level of ambition of plans for the development of STWs in Budapest. While the construction of the first 30 000 m3/d stage of the South pest STW took 8 years to build, the first phase of the Program, construction of the North-Pest STW and expansion of the South-Pest facility would entail the construction of 182 000 m3/d treatment capacity over only 11 years. That is, in excess of a fourfold increase in the amount of treatment capacity to be built yearly. The pace was supposed to increase even more substantially in the next phase, when over ten years from the mid to late 1980s 1,332 m3/d treatment capacity was to be constructed. An eightfold increase of the phase set for the mid 1970s to mid 1980s period, and a 32 fold increase in comparison to the pace at which the South-Pest STW had been built.

While it is true that the initial stage of the South-Pest works was the first large scale STW built in Hungary, and thus a learning experience, the acceleration of pace prescribed by the Program was still daunting. The most pressing factors were the scale of the investments and the availability of free capacities in the Hungarian construction industry to actually build the actual installations. According to the initial calculations presented with the Program, about 1 billion forint would have to be invested yearly to keep this pace.[307]

Considering the fact that this estimate was a result of a planning process which was to take into account the "..carrying capacity.." of the plan economy, it seems obvious to me that the Program was based on the same assumptions about the future availability of funds as the in general ambitious plans for urban development in

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[305] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: p.250

[306] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: pp. 26-27

[307] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.25

Budapest. That is, that the NEM process and the shift towards intensive industrial development would generate steadily increasing profits. This becomes even more clear when taking into consideration the fact that lack of funds prevented the full implementation of the more moderate plans of the 1960s.[308]

As for the relation of the Program to Enyédi's visions of realising the potential advantages of the socialist system in environmental protection through the integration of the planned, "..proper use of the environment..", I see the Program as a move in this direction. Until then, exemplified by the construction of the South-Pest STW, the implementation of wastewater treatment had been responsive, a reaction to extant problems. Although the first step of the Program, the North-Pest STW was also constructed in response to if not an extant, then at least an immediately impending problem, as a whole I see the Program as representing a broader and more long-term outlook.

Although preservation of the Danube's recreational functions in Budapest was also an important objective, and was also decisive in determining that the Northern STW was to be built first, I would argue that preventing the deterioration of drinking water quality at Csepel was a more significant goal. However, this was but a potential problem. It was uncertain at which level of pollutant loading the problems would appear, however, it was perceived as most certainly being in the long run. While this was so, the construction of STWs and the parallel but independent implementation of industrial treatment was also a long term process, especially as the potential pollution problem along western Csepel was a result of the aggregate wastewaters of Budapest.

On the basis of this, I would argue the Program was based on long term perspectives on the influence of urban and economic development on the use of aquatic resources and the relationship between various uses. Moreover, each accomplished step in the Program would if initially not reduce, then at least slow down or stabilise the deterioration of the Danube. Thereby, if not preventing, then at least postponing the point where the water in the western Csepel Aquifers would begin to deteriorate.

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[308] Gilltner, A. (ed) (1970) *Budapest Közmü és Mélyépitési Távlati Terve (1971-1985)*, Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p. 76

3.4 Chapter Summary

The perceived necessity of developing the Csepel aquifers, integrating their organic capability of purifying surface water into the water supply system operated by FVM, was thus borne out of the ambitions of the 1970 ÁRT to further improve the standard of living in Budapest. The increasingly regional scope of FVM was also to ensure the possibility of similar progress in the agglomeration settlements which did not have sufficient water resources of their own. While the significance of the ratio of drinking water consumed by Budapest's industrial sector was to decline, the increased production of bank-filtered water was also planned to facilitate further industrial growth in Budapest.

Improved and extended water supply was intrinsically connected to the housing programme, the flagship of the socialist regime in the effort to increase the standard of living in Budapest. Moreover, the progress of the housing programme on to greenfield sites in the peripheral districts of the Hungarian capital made the long standing plans to also develop the south-eastern districts, and the provision of water for these an immediate concern. Thus, despite the fact that the already established Szentendre waterbases, with their upstream position and well mapped hydro-geological basis would have been able to meet expected water demand until after 1985, the expansion of water production on Csepel was approved, despite the potential risks its downstream position was associated with.

Increased water consumption, as a result of the increasing number of people thus flushing their various wastes into the Danube, the increased volume of water utilised, as well as continued industrial growth and development, if left unchecked, was expected to cause further deterioration of the quality of the Danube's water, especially downstream of Budapest. Bacteriological quality, the classical issue around which sanitary engineering had been organised until the postwar era, not only in Hungary, but also in the rest of the world, was thus through the introduction of improved techniques of chlorination greatly reduced in its significance as a public health risk in Budapest already by the early 1970s. Despite dismissal by some, like Bíro and Hajdu, of the degradation of bank-filtered waters as a result of intensification of the pollutant loading of the Danube as a potential public health risk, this possibility was obviously taken seriously by many other actors, including central

decision-makers.

The fact that the development of the Csepel aquifers still went ahead was based on the planned stabilisation and eventual improvement of the quality of surface water in the Danube downstream of Budapest. This entailed that through a process of environmental development, the implementation of municipal and industrial wastewater treatment, the Danube would in the long run cease to function as an active part of the organic machine which the integration of it's intrinsic processes into the drainage system of Budapest made it. While this would nullify one of the significant advantages of the highly advantageous water resource situation Budapest's position on the Danube entailed, the low costs associated with entrusting the task of neutralising potentially harmful pollutants to the river, this was not expected to be an insurmountable problem.

The regime was certain that it through the reform process underway and the planned phase-shift towards intensive industrial development, sufficient funds for this and the other ambitious infrastructural projects approved around 1970s would be available. Moreover, the planned development of the institutional and legislative basis of environmental protection, as well as the integration of environmental concerns and goals into the planning and redistribution processes of the Hungarian socialist system, was expected to facilitate the necessary policy and enforcement tools needed to implement a reorientation of Budapest's resource use on this scale.

FVM's dismissal of surface-water treatment as a tenable future source of drinking-water was in addition to its lower aesthetic quality and its potential as a source of significant risks also related to its higher relative cost in comparison with bank-filtering. This, the concern over the potential need for increased drinking-water treatment as a result of escalating quality problems with the system of bank-filtered wells operated by FVM was also among the main arguments for implementing wastewater treatment. Thus what led to the choice to in the long term phasing out the use of one of the organic machines on which Budapest's advantageous water resource endowment was based, was the fear that the other would cease to function as it had, leading to increased costs.

While I do not have access to concrete figures regarding the relative cost of drinking-water versus wastewater treatment, I would argue that it was not simply

such a comparative cost benefit analysis which lay behind the choice of abandoning the use of one organic machine over the other. In the political context of the 1970s in Hungary, with increasing focus on the standard of living and also on the quality of life of Budapest's citizens, stabilising and in the long run improving the quality of the Danube's surface water at Budapest served several purposes. Through enabling safe and worry free utilisation of the recreational opportunities the Danube offered, improving the aesthetic quality of the inner city, as well as being a large scale effort for the people, choosing wastewater treatment over drinking-water treatment fulfilled a much broader range of purposes.

4 Chapter 4

During the course of the 1970s and 1980s Budapest, as I. Szelényi has characterised it, "entered a qualitatively new trajectory".[309] Extensive industrialisation had come to an end in the 1960s, and was now followed by tertiarisation, intensive development and by the 1980s, industrial decline. Budapest had entered the post industrial era. Moreover by the late 1970s the population of the Hungarian also peaked. These changes were to have a significant impact on how the consumption of the Danube developed between 1970 and the end of the socialist era in 1989.

The 1970s were to be the start of a diversification of Hungarian development. While the dominance of industrial development had receded somewhat in the 1960s, the continuation of extensive industrial development in less developed parts of Hungary did impose limits on the funding available for non-prductive investments. In light of the improving economic performance around 1970 and the "leap ahead" in living standards this had brought, prospects were deemed to be bright. The level of ambition of the 1970 ÁRT, which promised that significant advances were to be made in the modernisation of the capital, was representative across the board.

Thoroughgoing changes were also planned for Budapest's water management. In order to meet the rising water demand the growth of the city was expected to entail, the Danube along Csepel was now to function as both source and sink. In order to preempt the conflict between these uses the expected growth of Budapest's wastewater discharges was feared to cause in the long run, as laid down in Program, Budapest's utilisation of the Danube to neutralise pollutants was to be phased out. Thus Hungary and Budapest joined the prevailing trend in developed economies, as among others Tarr, Bendickson and Cioc have described it, of de-coupling urban and industrial growth from the degradation of aquatic environments.[310]

The Program and the emphasis on industrial pre-treatment which was to

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[309] Szelényi, I. (1996): "Cities Under Socialism – and After" in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd: p. 298

[310] Tarr, J. A. (1996) *The search for the ultimate sink : urban pollution in historical perspective*, Akron, Ohio: University of Akron Press

Bendickson, J. (2007) *The Culture of Flushing: a social and legal history of sewerage*, Vancouver: UBC Press

Cioc, M. (2002) *The Rhine : an Eco-Biography, 1815-2000*: Seattle : University of Washington Press

accompany it in Budapest were part of a wider effort to manage and prevent the environmental consequences of rapid urban and industrial growth in Hungary. Following up the work started with the 1972 constitution and its codification of "the right to a healthy environment", the Kádár regime planned to make further advances in the institutionalisation of environmental protection in Hungary. Through legislative, regulative and institutional development, environmental concerns were to become fully integrated into the Hungarian economy. Hungarian socialism was to be greened. As discussed in chapter 3, the bright economic prospects of the early 1970s was a basic premise also in this endeavour.

However, the turbulent conditions of the international economy in the 1970s, as well as the responses of the Kádár regime to these changing circumstances led to a reversal of the positive economic trend already in 1972. During the course of the 1970s the performance of the Hungarian economy declined further, and by the early 1980s a crisis ensued from which the socialist economy would never recover. Through the focus on an industrially led economic recovery and the leeway this gave industrial actors, a significant implementation deficit developed in all sectors.

This had a significant impact on the pace and scope of the plans for the modernisation of Budapest, the plans for an overall greening of the polity and economy, as well as the concrete plans for Budapest's water management. The level of ambition for the development of the capital was reduced steadily in response to the mounting crisis, but even downsized plans could not be fulfilled. In terms of the planned development of environmental protection apparatus of Hungary, ambitions also declined steadily. From a focus on preemptive and long term approaches in the 1970s, by the end of the socialist era the level of ambition had been reduced to preventing further deterioration in a few priority fields.[311]

The further development of the organic machines established on the Danube, and especially the management of the potentially problematic relationship between them was also affected by the widening implementation deficit. While the development of the western Csepel aquifers as a source progressed more or less according to plan, although with some quality issues, the Program, and the implementation of industrial pre-treatment which was to accompany it fell behind

[311] Enyédi and Zentai: p. 220 citing the declaration of the 11th Party Congress of the MSZMP [Hungarian Socialist Worker's Party] and p. 221

schedule almost immediately.

As I will argue in this chapter, these delays were to a large extent due to the persisting perception of wastewater treatment as postponable. Similarly as what Bendickson has argued was the case in a Western context, the arguments for postponement of wastewater treatment in Budapest were based on reference to economic advantages and the great capacity of the Danube as a sink.[312] Or as Oszlay put it in 1985, "...its investment substituting capacity for self-purification..."[313] Moreover, another important element in the equation of postponability was that as perceived until the very end of the socialist era, the feared conflict between the two organic machines along Csepel did not come to pass. While there were quality issues with the water drawn for the new bank-filtered wells at Csepel, these were seen as being a consequence of the intensity with which the Danube was used as a sink.

Despite, one might argue, the limited progress in phasing out the utilisation of the Danube as a sink, by the end of the socialist era the quality of surface water in the Danube at Budapest had been stabilised. However, significant challenges in this field remained. Many of these challenges arose as a result of changes internationally in how the role of aquatic media as sinks was perceived. As a result of both public pressure and increasing knowledge about how the many new and also many of the old industrial pollutants acted in an aquatic environment, these were increasingly perceived as a risk. By the end of the socialist era, research on bank-filtering in the Budapest area had produced results which challenged the dominant risk image on which the continued utilisation of the Danube's intrinsic processes for neutralising rested. Both in relation to the risks associated with the reactivation of persistent pollutants, and in relation to Budapest's main problem in terms of drinking water quality, iron- and manganese-ions, utilising the Danube as a sink had come to be seen as a risk.

This chapter is divided into six main parts. In the first, I will discuss the reasons for Hungary's mounting economic problems, and how this affected opportunities for investments in urban development and environmental protection. The second part will be looking at how the declining availability of investment funds

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[312] Bendickson, J. (2007) *The Culture of Flushing: a social and legal history of sewerage*, Vancouver: UBC Press: pp. 327-328

[313] Oszlayi, I. (1985): "Duna egy vödör vízben" : *Budapest*, 23(11): p.15

affected, first urban development in Budapest, and then the attempted greening of Hungarian socialism. The discussion of these issues will establish the basis for explaining how the water management of Budapest developed in the 1970s and 1980s.

I will then start the part of the thesis which deals explicitly with water with an interlude on the new perspectives concerning the use of the aquatic environment as a sink which emerged in the West in the 1960s and 1970s. In part four I will discuss how urban and industrial development affected the utilisation of the Danube as a source: how and why drinking water consumption peaked in the 1980s; and how the production of drinking water at Csepel encountered new and old problems.

In part 5 I will look at the consumption of the Danube as a sink. First at how and why the phase-out of the utilisation of the Danube for pollutant neutralisation did not progress as planned. Moreover, how this was related to the overall development of the economy; to the implementation gap in urban development; to the failure of the efforts to institute the model of environmental management chosen by the Kádár regime; and finally, to the perception of the Danube as a sink and source. I will end this section by looking at how wastewater treatment, as well as urban and industrial development affected the intensity with which the Danube was utilised as a sink, that is, the development of surface water quality. Part 6 will concern itself with a discussion of how the perception of conflict between the source and sink functions of the Danube developed.

4.1 The Crisis of Market Socialism: Big Businesses and the Investment Shortage

Despite the generally positive results of the NEM reforms between 1968 and 1972, the the plans for further decentralisation were never to be realised. Problems with over-investment, internal resistance and a more conservative policy climate in Moscow led to the halting of the NEM process in 1972, and then a gradual reassertion of central control over industrial decision-making and funding.[314] This process was accelerated by the 1973 Oil Crisis, which "transformed the political economy of Hungarian market reforms." according to Bartlett.[315]

[314] Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso: p.119

[315] Bartlett, D. L. (1997) *The Political Economy of Dual Transformations : Market Reforms and Democratization in Hungary,* Ann Arbor, Mich. : University of Michigan Press: p. 55

Between 1972 and 1987 the Hungarian economy went through several waves of reforms and counter reforms, alternating between centralisation and market orientation, as well as restriction and encouragement of growth.[316] While there were periodic signs of recovery, the reforms were unable to resolve the underlying problems. The main problems persisting through the socialist period were the low efficiency and profitability of Hungarian industrial enterprises, the persistently negative foreign trade balance and mounting foreign debt. Most significant in the context of explaining the lower than planned levels of spending on urban development and environmental protection was the prevailing over-investment in the industrial sector and the constant scarcity of investment capital this entailed.[317]

Hungary's persisting economic problems and the effect they had on the availability of funds for investment in urban and environmental infrastructures during the 1970s and the 1980s was to a large extent of the influence big industrial enterprises had in decision-making and planning. As a part of the effort to bolster the economy after the effect of the 1972 oil-shock made themselves felt, the regime designated Hungary's 50 biggest industrial enterprises as “privileged”, which as Swain describes it entailed that “the full rigours of market discipline no longer applied to them”.[318] This resulted in the institutionalisation of what Szalai calls an “uneven economic mechanism”, which despite attempts to counter it during the period of renewed reforms persisted until the socialist era.[319]

The institutionalised nature of this “uneven economic mechanism”, entailed that 'the 50' came to be able to take exemptions from plans, policies and regulations, as well as extra funding for granted. Moreover, it also entailed that “...the big businesses gain(ed) a lot of influence on the articulation of intermediate plans, in which of course the(y) were able to shape economic policy and the regulative system to suit their interests....”[320] The discrete regulatory interventions of which the uneven

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316 Bartlett, D. L. (1997) *The Political Economy of Dual Transformations : Market Reforms and Democratization in Hungary,* Ann Arbor, Mich. : University of Michigan Press: pp. 55-56

317 Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso: p.125, 127, and 138, pp. 129-130 and 142-143

318 Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso: p.119

319 Szalai, E. “Libikóka: Gazdasági Mechanizmus és Nagyválalati Értékek” in F. Nikosz and A. Örkény(ed) *Magyarország Társadalomtörténete 1945-1989: 2*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó p. 293

320 Szalai, E. “Libikóka: Gazdasági Mechanizmus és Nagyválalati Értékek” in F. Nikosz and A. Örkény(ed) *Magyarország Társadalomtörténete 1945-1989: 2*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó p. 293

economic mechanism consisted were attained through bargaining between 'the 50' and central bodies. The arguments presented by 'the 50' in these bargaining processes and supported by their patrons in the industrial ministries were based on their significance for the plan economy. That is, their quantitative contributions towards achieving centrally set economic goals.[321]

As a consequence of the strong bargaining position of 'the 50', as Swain argues "...a systematic redistribution of funds from profitable to unprofitable enterprises took place.." through the bargaining for and granting of supplementary investments.[322] Or as Szalai puts it, the regulation bargaining of the 1970s and 1980s made it ".. possible for the big businesses to rely on their connections and arguments economic performance to siphon off profits from other sectors of the economy."[323] This situation was by Kornai in the 1980s described as one where.."soft budget constraints.." prevailed. That is, that enterprises, especially 'the 50', were not allowed to fail despite lack of profits, and that price and tax policies were not treated as "effective constraint, but only acted as an accounting relationship over which bargaining were possible".[324]

Due to the fact that the central development fund, the source of all state investments was not differentiated, that is, that there was one large pot for all purposes, the negative effects of the soft budget constraints were not limited to economic policy. As there was only a certain amount of funds set aside, the massive level of subsidisation 'the 50' were able to ensure through bargaining came at the expense of other planned investments. This was not limited to other enterprises, the profits of which these subsidies were taken from, but also investments in urban development and pollution abatement.[325]

However, it is important to emphasise that the way the soft budget constraints and the "uneven economic mechanism" were utilised by industrial actors was

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[321] Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso: p.125 and Szalai, E. "Libikóka: Gazdasági Mechanizmus és Nagyválalati Értékek" in F. Nikosz and A. Örkény(ed) *Magyarország Társadalomtörténete 1945-1989: 2*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó: pp. 293-295

[322] Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso: p.128

[323] Szalai, E. "Libikóka: Gazdasági Mechanizmus és Nagyválalati Értékek" in F. Nikosz and A. Örkény(ed) *Magyarország Társadalomtörténete 1945-1989: 2*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó p. 293

[324] Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso: p. 124, citing J. Kornai

[325] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham p. p.221

motivated by realising their narrowly defined special interests. After the implementation of the NEM reforms in 1968, state ownership in Hungary did not translate into state control over industries. According to L. Antál, by the time it was attempted to recentralise control over industrial decision-making in 1972, the NEM reforms had led to changes in the way industrial actors acted and perceived themselves which proved impossible to roll back.[326]

Already in the late 1970s, but even more so in the 1980s, when renewed reforms and austerity measures were on the agenda, the course advocated by the big businesses, always more growth and redistribution, ran counter to centrally set macroeconomic policy goals.[327] This was a result of their influence on defining what was in the national interest, more specifically, how economic recovery was to be achieved.[328] In fact, through their collective and individual bargaining actions, the big businesses were able to resist and subvert macroeconomic policies, and thus through their advocacy of over-investment creating a significant implementation deficit in the economic policies of the Kádár regime.

This ability to resist and influence macroeconomic policies and concrete plans was of course dependent on the willingness of the regime to listen and to conduct economic policy in ways which facilitated the influence of the big industrial actors. That is, the centralised redistribution of funds, the overriding priority assigned to industrially led economic recovery and the orientation towards discrete regulative interventions in order to further central goals.[329] However, although efforts were made during the 1980s to curtail the influence of industrial actors on central economic policy, as well as their flexibility in relation to its implementation through bargaining, these efforts failed to work as intended.[330]

The softness of the budget constraints and the orientation towards realising quantitative production targets regardless of efficiency and profitability led to a

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[326] Antál, L.(2000) "Fejlödés – Kitrövel: A Magyar Gazdasági Mechanizmus a 70-es Években" in F. Nikosz and A. Örkény(ed) *Magyarország Társadalomtörténete 1945-1989: 2*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó: p.276

[327] Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso: p. 138, 139 and pp. 141-142

[328] Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso: p.109

[329] Szalai, E. "Libikóka: Gazdasági Mechanizmus és Nagyválalati Értékek" in F. Nikosz and A. Örkény(ed) *Magyarország Társadalomtörténete 1945-1989: 2*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó p. 295

[330] Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso: p. pp. 138-139 and p.141

constant "...scarcity of development resources - both at the state level and in enterprises.."[331] As Enyédi and Zentai go on to emphasise, this was not due to the poverty of Hungary.[332] Rather, I would argue, through their influence on and ability to resist economic policy the industrial actors in Hungary created an implementation deficit which had wide repercussions for the rest of the socialist system. While this would have been impossible without at least periodic cooperation form the central government, the fact remains that this represents a failure of the brand of reform-socialist economic system implemented in Hungary. The planned economy simply proved unable to follow the plan.

4.2 Urban Development and Environmental Protection and the Crisis of Market Socialism

As discussed in chapter 3, the ambitious plans for Budapest's development in the 1970s were predicated on significant increases in central government funding. Whether this was for; "*..the renewal of the entire existing urban structure."* which the development of the city's housing functions was to entail; the continued improvement of the standard of living to be ensured by the decentralisation of service provision; or as this thesis focuses on, and as I will discuss in detail in the next section, reworking the relationship between the city and the river through the implementation of the Program.

Following the planned pace and scope of development proved even more difficult outside the industrial sector. As the expected industrial profits did not materialise, Councils were forced to enact cuts and prioritise the projects they considered most essential, also in Budapest.[333] Moreover, the influence of the large industrial actors was also apparent in the Council sector. Through their influence in central decision-making processes determining economic policy and redistribution, as well as similar processes at the local level, they were able to make sure that the projects deemed most important for ensuring their further growth were prioritised

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[331] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham p.229 and Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso:Swain, p.127

[332] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham p.229

[333] Buza, B. et al. (1971) "Fővárosi Tervek – Fővárosi Realitások", Budapest, 10(5): p. 4

over others. During the 1980s, when the implementation of austerity measures became necessary, these difficulties were exacerbated, and after 1985 no significant new investments were initiated. In the following I will discuss how this affected urban development and planning in Budapest, as well as the institutionalisation and funding of environmental protection at a general, national level.

4.2.1 The Development of Budapest

As a result of the return to economic problems already in the early 1970s and then economic crises in the 1980s, the improved investment conditions of the late 1960s and early 1970s proved to be transitory. Already by 1972 similar the Municipal Council had to prioritise the investments it deemed most pressing, as the means made available by the central government were not sufficient to maintain the planned scope and pace.[334] The difference between what had been planned and what was achieved, the implementation deficit, as it had in the 1960s, remained characteristic of Budapest's development also during the 1970s and 1980s.[335]

While this was so, the general direction of the urbanisation process changed in significant ways during the 1970s and 1980s, and was also accompanied by significant changes in the urban structure. In terms of the former, Budapest's population peaked in 1979, at 2,1 million, significantly below the 2,3 million with which the 1970 ÁRT and its diverse sub plans operated.[336] For all intents and purposes extensive industrialisation came to an end in Budapest already in the 1960s, and was in the 1970s followed by tertiarisation. Between 1975 and 1987 there significant increase in the proportion of white collar employees in Budapest's industries.[337] By the 1980s, this was followed by de-industrialisation, as the output of Budapest's industries declined by 10% in the course of the last decade of the socialist era.[338]

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[334] Buza, B. et al. (1971) "Fővárosi Tervek – Fővárosi Realitások", Budapest, 10(5): p. 4

[335] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: pp. 149-152

[336] Hungarian Central Statistical Office, "National and county Data – Budapest – Retrospective Data" in: *Population Census 2001,* table 1.1.1 Population, population density, increase of population, 1870–2001. http://www.nepszamlalas.hu/eng/volumes/06/01/tabeng/1/load01_1_0.html accessed online on 11.05.2011

[337] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: p. 103

[338] Bajnay, L and G. Kopcsayi (1998) "Az Ipar Fejlödése – Ipari Területek, Ipari Üzemek" in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: table: "A termelés alakulása ágazotként", p. 166

As to changes in the urban structure, state funded housing development was the sector which had the greatest impact. Although significant advances were made in many fields, especially in housing, many of the planned improvements were postponed. Most significantly, rather than the dual focus on intensive, large-scale housing estates on peripheral greenfield sites and intensification of inner city densities through renewal, only the former was implemented.[339]

While the inner city as a result of this remained unchanged structurally and continued to decay, the new greenfield estates nevertheless constituted a significant change. By the late 1980s, when the construction of large estates ground to a halt, the peripheral estates surrounded the city as a ring, housing almost half the city's population.[340] The most central change this entailed in the context of this thesis was that as planned, all these apartments had individual modern sanitary facilities, which as expected had a significant impact on per-capita water consumption.

As mentioned in my discussion of the 1970 ÁRT in chapter 3, large-scale housing development in the peripheral districts made several associated infrastructural investments necessary. Despite the prevailing difficulties with following the planned pace and scope of urban development in Budapest in the 1970s and 1980s, both the 1980 and the 1988 ÁRT called for significant measures aimed at modernising the urban structure. One of the main foci of these efforts was addressing this need for the decentralisation of the service provisioning structure created by the new greenfield estates. In both the 1980 and 1988 ÁRT planners and decision makers devoted significant attention to the creation of a series of sub-centres. Moreover, as a return to a wider geographical scope in the planning of the Budapest region, sub-centres, or central places were also planned for the agglomeration zone.[341]

As I see it, although the ambition of the ÁRTs decreased over time, and one might say became more realistic, the ambition of making Budapest a better place to live remained in spite of the mounting economic difficulties. Despite the overriding priority assigned to industrially led economic recovery at the national level, I would argue that the intention of making significant advances in the modernisation of Budapest remained a real one. It is important to remember that the scarcity of

[339] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: p. 149
[340] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: p. 149
[341] Enyédi, G. and V. Szirmai (1992) *Budapest: a Central European Capital*, London: Belhaven Press: p. 151 and 152

investment funds was due to over-investment in industrial development, and that it was just that, investment beyond the planned level.

Thus, the inability of the regime to rein in the industrial enterprises, or rather, the ability of the latter to resist and circumvent centrally set macroeconomic policy goals, an implementation deficit in its own right, led to to an implementation deficit in relation to the plans for Budapest's development. In fact, I would argue that the prevalence of this implementation deficit in urban development must be considered characteristic of the three decades of planned, socialist urban development in Budapest. As Enyédi put it when arguing against the socialist character of the urbanisation process: "(t)e importance of planning has been overemphasised as the key feature of socialist urbanisation..."[342]

Enyédi and Szelényi, in their respective contributions to *Cities After Socialism*, agree that Budapest's development by the 1980s had entered a "post industrial phase". While this is so, they disagree on how this was to interpreted: as Enyédi argues that it constituted a fruther convergence with the "...generally applicable global process of urban development...", that it was the beginning of suburbanisation as it had been seen in the West; or as Szelényi argues that this was a new, but still distinctively socialist phase of urban development.[343]

In the context of this thesis this discussion, with its primarily theoretical implications has but little significance. As I see it, Budapest was at the same time becoming more similar to other modern cities all the while retaining significant special characteristics caused by the socialist context. The former through the halt of population growth, the modernisation of the city, especially the housing stock, and the tertriarisation and declining significance of industrial production. The latter due to the fact that as I see it, the main factor determining the course and form modernisation took in Budapest was the tension between the ambitious socialist goals for the city on the one hand, and the restrictions imposed by the lack of investment funds on the other.

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[342] Enyédi, G. (1996)"Urbanization Under Socialism", in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. p. 104

[343] Szelényi, I. (1996): "Cities Under Socialism – and After" in G. Andrusz, M. Harloe and I. Szelényi (ed): *Cities after Socialism: Urban and Regional Change and Conflict in Post-Socialist Societies.* Oxford, UK: Blackwell Publishers Ltd. pp.298-299 and Enyédi in cities, p. 102

As I will discuss in section 4.4, the one might say peaking of the population and the decline of industrial production had very significant impacts on the consumption of the Danube as source and sink. As I will argue, these were the most significant factors contributing to the fact that also drinking water consumption and thus the volume of wastewater discharges peaked in the late 1980s. Moreover, the modernisation of the housing stock through the housing programmes also had a significant effect, as the prevalence of modern sanitary facilities, through the upwards pressure on per-capita water consumption these engendered, was the most significant factor in determining the pace of household water consumption. Thus, the failure of the regime to carry out the planned inner city reconstruction was also significant in terms of water consumption, as this entailed that fewer than planned Budapest residents had modern sanitary facilities.

Finally, as I will discuss in section 4.5. the implementation deficit characteristic of the efforts to improve and modernise Budapest in the 1970s and 1980s also had a significant effect on efforts to implement the plans for the development of the city's water management. As a result of the implementation deficit, all plans for Budapest were constantly up for reconsideration in relation to the always limited, never sufficient means made available at a given point in time. Thus what was implemented was a result of what decision makers in the central government and Municipal Council considered to be a priority. This included the housing programmes and the development of water production. These were important fields for enabling further economic growth, as well as for increasing the standard of living. The development of sewerage and wastewater treatment, on the other hand, as I will discuss in section 4.5, did not fare so well.

4.2.2 Greening the Plan Economy:High Ambitions and Limited Possibilities

The inclusion of “the right to a healthy environment” in the 1972 constitution was the first step in a plan for institutionalising the until then fragmented and unplanned field of environmental protection in Hungary. As most other large scale undertakings, this was in Hungary seen as a task for which the central government should be primarily responsible.[344]

[344] Enyedi, G. and V. Szirmai (1998) “Environmental Movements and Civil Society in Hungary.” In: A. Tickle

The plan was for the process of institutionalisation to continue in the latter half of the 1970s and into the 1980s. Through legislative and institutional development environmental protection and "proper utilisation of the environment", as I have cited Enyédi on in chapter 3, were to become integral parts of the decision-making processes of the Hungarian socialist model.

This, however, was recognised as a long term goal. In the mean while further deterioration of the environment and the possible negative consequences this might have for the health of Hungarians and possibilities for economic development had to be prevented. This was to be achieved through further development of the system of disincentives, which the Wastewater and Sewerage regulations already implemented in the 1960s were early examples of. Moreover, further, stricter sanctions were also to be applied. Coupled with incentives, in the form of state subsidies for pollution abatement technologies and other environmental infrastructures, this was to bring environmental degradation to a halt.

However, to a large extent due to the deteriorating economic performance, the Hungarian regime fell short of its goals also in terms of environmental protection. The planned measures and the escalation of spending, as well as interferences in the productive activities of industrial enterprises they entailed, was as with the planned acceleration of urban development premised on the assumption that investment conditions would improve. My account of these issues is based on G. Enyéd and V: Zentai's 1987 contribution to the book *Environmental Politics in East and West*. This is the only thorough description and analysis of Hungarian Environmental Policy during the socialist era I have been able to locate, and the following is to a large extent a digest of their material.

4.2.2.1 Principles, Institutions and Policies

The next significant move of the regime towards the integration of environmental concerns into the socialist system was the passing of the 1976 Act on the Protection of the Human Environment. This piece of legislation codified the 1972 "right to a healthy environment" in detail. According to Enyédi and Zentai this act "...formed an integral part of the existing law, while at the same time setting the

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and I. Welsh (ed) *Environment and Society in Eastern Europe*. Harlow: Longman: p.148

whole of environmental legislation in a system of independent and new structures."[345] This act was to serve as the basis of Hungarian environmental protection until the end of the socialist era.

The definition of environmental protection in Hungary during the socialist era was broader than what was the case in most Western countries. In addition to protection against already extant harmful phenomena, in Hungary environmental protection was also defined as entailing "..the planned development of the environment."[346] As discussed in chapter 3, Enyédi had argued for such planning as an essential means of realising the advantages the socialist socio-economic order was perceived as possessing in the filed of environmental protection already in the 1960s.

The core principle of the act was "...a general rule prohibiting causing any pollution, damage or other unfavourable effect to the protected elements or altering their natural characteristics for the worse or spoiling the conditions of human life."[347] More specific clauses and regulations were derived from this principle, producing enforceable procedures, prescriptions and prohibitions. By the end of the 1970s, through the new Act and reorganisation of older ones, a "...uniform nationwide system of environmental protection.." had been established.[348]

This system was maintained and enforced through a highly centralised institutional structure. The council of ministers was responsible for determining the principles of environmental protection. Moreover also for the "..control, coordination and development of all environmental protection activities.".[349] In other words, for determining concrete policies, determining sanctions and determining budgets and investments. Although institions lower in the state hierarchy were given sectoral tasks, and an Environmental Ministry was established in 1985, central controll remained dominant.[350] As I will discuss below, due to limited funding, the soft budget

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[345] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham p.217

[346] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham p.217

[347] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p.217

[348] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p.217

[349] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p.217

[350] Enyedi, G. and V. Szirmai (1998) "Environmental Movements and Civil Society in Hungary." In: A. Tickle and I. Welsh (ed) *Environment and Society in Eastern Europe*. Harlow: Longman: p.148

constraints and the independence of the industrial actors which were the primary polluters and subjects of regulation, the efforts of the various institutions to enforce environmental legislation had limited success.

The central guidelines and policies of environmental protection determined by the Council of Ministers during the period from the mid 1970s to the end of the socialist era exhibit a similar tendency as the ÁRTs for Budapest. Looking at the level of ambition, the effect of the mounting economic troubles, in terms of the declining availability of resources is apparent. Until around 1980 the level of ambition remained quite high. The basic principle was already in 1975 at the 11th Party Congress declared to be "..not only to stop the harmful processes, but to ensure development as well.", as later enshrined in the 1976 act.[351] The plans discussed at this Congress included the initiation of the first serious investment package of the Program.

The aim of planned development of the environment was reaffirmed with the 1980 National Conception for Environmental Protection, which stated that "... the environment must become an organic part of the economic activities and planning,.." [352] As I see it, this is a clear sign that the perspectives fronted by Enyédi in the 1960s about the necessity of making environmental protection and development a part of the reproduction process in order to realise the potential advantages of socialism in environmental protection had become part of the central environmental discourse. This was to facilitate the twin goals of "..elimination of all the existing sources of pollution and of prevention of future pollution."[353] A focus on environmentally sound technologies and the introduction of environmental impact assessments were further tools.[354]

However, later in 1980, when these aspirations were to be translated into specific goals during the elaboration of the 6th five year plan ".. environmental strategies were designed in accordance with an economic policy that intended to meet

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[351] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 220

[352] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 220

[353] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham:, p. 220

[354] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 220

the demands of the difficult economic situation...".[355] The growth of the volume of investments in environmental measures was expected to be slower than during the 5th five year plan. Consequently the overall aim was narrowed to halt environmental deterioration, rather than eliminating sources of pollution.[356] Moreover, "(f)inancial resources were concentrated on the most endangered areas..", including the Budapest region and the sewerage of the Balaton region.[357] The latter absorbed significant shares of the funds earmarked for water quality protection in the 1980s.[358]

The ambitions had been lowered even further by the mid 1980s, when the 7th five year plan was drawn up. As a result of the by then critical economic crisis "...the productive sectors of the economy (got) absolute priority."[359] This limited the scope of activities to the most urgent environmental issues, and precluded the "..possibility for a long-term, preventive environmental development."[360] In other words, postponing the realisation of socialisms the environmentally progressive and proactive potential of socialism. Environmental deterioration was expected to grow again by 1990, however "..to keep surface water quality at the present level...", was a clearly stated goal.

4.2.2.2 Intermediate Policy Tools: Disincentives and Incentives

In the interim, while the work of greening the basic processes of the socialist polity and economy was still not completed, a system of regulations and standards as well as disincentives and incentives was to bridge the gap. These measures were to prevent further degradation of the environment as well as condition producers and other entities responsible for polluting activities to make environmentally benign choices. The basic rules and regulations for each environmental field were established on the basis of the 1976 act, other relevant as well as specific regulations set by the

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355 Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 220

356 Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: pp. 220-221

357 Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 221

358 Varga, M. (1986) "A Vízellátás és Csatornázás VII. Ötéves Tervi Fejlesztési Koncepcijója" *Hidrologiai Közlöny;* 66(3): p. 124

359 Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 221

360 Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 221

responsible authorities. In cases where these limits were breached the state and the various branches of the environmental administration, at least in theory, had four types of sanctions available; restriction or prohibition of the polluting activity, compensation for damages, criminal law procedures and finally, environmental fines. [361]

However, in practice, the final and least problematic of these, the environmental fines, were the only one of these applied with any regularity.[362] According to Enyédi and Zentai this was a result of "(t)he peculiarities of state property and the economic mechanism.."[363] That is, that the industrial processes polluting the environment also result in products which for one reason or another were considered important by the state.[364] Thus cessation of activities was not considered as a viable option, nor strict punishment in the form of payment of damages or criminal law proceedings. As I see it, these self imposed limitations in the scope of the socialist state's use of sanctions must have gotten stronger the more pronounced Hungary's economic difficulties, and continued industrial output consequently became critical for economic recovery.

While the environmental fines were intended to "..form appropriate behaviour.." among producers, they did not function as intended due to several reasons.[365] Until 1980, producers were allowed to "..pass the environmental fines as an expense."[366] Moreover, as Enyédi and Zentai put it: "for companies it is more favourable to pay environmental fines than to make environmental investments.".[367] They argue that this was primarily as a result of the shortage of investment funds. While fines were paid from profits before taxation, and thus did not affect the investment resources of the enterprise considerably, investment in pollution

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[361] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: pp. 221-222

[362] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 222

[363] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 223

[364] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 230

[365] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 224

[366] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 224

[367] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 224

abatement installations in most cases came from the development fund.[368] Even in cases where ear-marked central funds were awarded from central sources, this was in many cases used for other purposes than reducing pollution, and as long as production grew, it would have no serious repercussions.[369]

While local Councils were given the possibility of enacting local environmental regulations as long as these did not conflict with central regulations, their actual capabilities in this fieldwere very limited. As I have discussed in chapter 2, plans for regions and settlements, as well as the funding for implementing them were highly centralised. Thus, without such measures being part of central plans, the local councils, even as large ones as the Budapest Municipal council "..cannot solve themselves the environmental problems originating from the lack of appropriate infrastructure."[370] Moreover, their ability to act against industrial polluters was also severely constrained.[371]

I find Enyédi and Zentai's summary of Hungary's environmental protection efforts during the socialist era from 1987 fitting:

> "Hungary – together with more recently industrialized European socialist countries – started to build up its comprehensive environmental protection policy at an unfortunate historical moment, when, in the early 1970s, the period of rapid economic growth ended..... Although the government made serious efforts to increase environmental investments, there was no possibility to improve the quality of the environment under the difficult economic circumstances ..... Despite some progress achieved in certain fields – e.g. the reduction of dust pollution, the halt of further surface-water deterioration – the basic goal of the plan was not fulfilled: the quality of the environment has still been worsening since 1980."[372]

Their main argument being that it was not due to the lack of good intentions that the attempts to integrate environmental protection into decision-making and

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[368] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 224

[369] Enyedi, G. and V. Szirmai (1998) "Environmental Movements and Civil Society in Hungary." In: A. Tickle and I. Welsh (ed) *Environment and Society in Eastern Europe*. Harlow: Longman: p. 149

[370] Enyédi and Zentai, p. 224

[371] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: pp. 224-225

[372] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p. 229

redistributive processes and enforce the environmental regulations that had been determined failed. Moreover, that because of these shortcomings, environmental problems in Hungary persisted. Rather, it was the limits imposed by the economic situation which constrained the ability of the regime to carry through its well intended plans. However, the economic difficulties were at least in part, as I have discussed above, a result of the economic mechanism of the Kádárist system and its inherent industrial bias. As I will discuss below, specifically in relation to large scale, state directed infrastructural investments intended to deal with aquatic pollution, the oil-shocks and the economic difficulties they brought with them in the 1970s also led to postponements in non-socialist countries.

Thus, at a general level the attempt of the Kádár regime to green the socialist state and economy, to integrate environmental concern into the basis of the socialist system was not successful. As I will discuss more in detail in relation to Budapest's water management, environmental policies and plans remained ad-ons to more central programmes and plans. Moreover, the system of regulations and sanctions intended to prevent further environmental deterioration while the process of realising the envisioned system of planned socialist environmental utilisation did also not function as intended. This latter issue will be discussed in more detail through the lens of the efforts to encourage industrial enterprises in Budapest to treat their wastewaters.

4.3 Interlude: New Perspectives on Sources and Sinks

Ever since rivers and other bodies of water have been systematically used as sinks for urban and industrial wastes, this use of rivers has been interrelated with conceptions of risk and pollution. By the 1960s both the perception of aquatic media as sinks, as well as the risks associated with this use of water were changing. During the decades immediately after WWII both the quality of industrial wastewater discharges and the perception of risks associated with them changed. The expansion and diversification of industrial production, especially among the chemical industries, led to the discharge of larger quantities and more complex types of chemical substances. These changes emerged first where industrial and technical development had progressed the furthest, in Western Europe and North America.

Many of these new chemical substances which were being discharged were

persistent, that is, they were not broken down of their own accord, but rather deposited on the beds of rivers, lakes and oceans, and/or accumulated in aquatic food-chains. In the past, the deposition of various waste materials, such as organic sludge and heavy metals, on beds had been seen as a part of the self purification process.[373] But by the early 1970s U.S. scientists discovered that for example heavy metals deposited in such a manner could under certain circumstances be reactivated, and once again represent a significant risk to human health.[374]

Although the risk the toxic effects of many chemical substances represented to human and non-human health had been known and feared, the focus in the past had been on acute toxicity, that is, immediate lethal effects. Thus, the common practice when discharging substances which were known to have toxic effects was to ensure that the ratio between the substance discharged and the recipient ensured that there was no risk of acute toxicity. As the axiom went: "The solution to pollution is dilution."[375] By the 1960s however, it had become clear that also persistent, long-term exposure to low levels of toxins represented a risk.[376] Industrial toxins and chronic toxicity, as this was called, came to be seen as the big new risk associated with aquatic pollution.[377]

These discoveries challenged the scientific basis of the established practice of using aquatic media as sinks.[378] The processes of aquatic self-purification, however these were defined, did not eliminate persistent pollutants. Discharging these into aquatic media only removed them from the site where they arose, and transported the problem they represented to other sites. Moreover, the problem of chronic toxicity further invalidated the already controversial practice of managing toxic pollutant discharges by diluting them to avoid acute toxicity. Moreover, concerning the

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[373] Keeling, A. M. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" *Urban History Review/Revue d'histoire urbaine* 34(1): p.65
Keeling A. M. (2007) "Charting Marine Pollution Science: Oceanography on Canada's Pacific coast, 1938-1970" Journal of Historical Geography: 33(2): pp. 420-422

[374] Bendickson, J. (2007) *The Culture of Flushing: a social and legal history of sewerage*, Vancouver: UBC Press: p. 292

[375] Cioc, M. (2002) *The Rhine : an Eco-Biography, 1815-2000*: Seattle : University of Washington Press, p.111

[376] Carson, R. (1962) *Silent spring*: Greenwich, Conn.
Dunlap, T. (2008) *DDT, Silent Spring, and the Rise of Environmentalism*: University of Washington Press, 2008
Keeling, A. M. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" *Urban History Review/Revue d'histoire urbaine* 34(1): p.65

[377] Melosi, M. V. (2008) The Sanitary City : *Environmental Services in Urban America from Colonial Times to the Present*: Pittsburgh, Pa. : the University of Pittsburgh Press: p. 291

[378] Keeling, A. M. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" *Urban History Review/Revue d'histoire urbaine* 34(1): p.65

substances to which aquatic self-purification was actually applicable, such as organic matter, the persistence of overloading recipients was also increasingly being critiqued by among others the emerging environmental movement.[379]

However, the changes in the perception of the risks and problems of aquatic waste disposal in western countries was not only a result of new scientific knowledge and the concerns over new types of risks the spread of this entailed. As Arn Keeling has described in his case study of the Fraser river, the changing perception about the rationality of using aquatic media as sinks were also a consequence of re-evaluation of what functions and uses of aquatic media were important among the populace.[380] Initially this primarily amounted to a broadening of the range of human uses considered important, with which the use of aquatic media as sinks was in conflict. These were mostly recreational and functional uses. However, there was also an increasing focus on rivers as habitats for non human life, and in terms of rivers, "living rivers" were assigned increasing value.[381]

4.4 The Danube as a Source: The Peak of Water Demand in Budapest and Changing Perspectives on Quality Problems on Csepel

Contrary to what had been one of the basic assumptions in water management plans since around 1970, drinking-water consumption in Budapest peaked already in the late 1980s, significantly below the expected peak volume. To a large extent this was a result of the fact that industrial water consumption peaked already in 1979, and was declining by the late 1980s. As I will elaborate on in this section, this was due to a combination of improved water conservation, the tertiarisation of Budapest's industries as well as the impact of the economic crisis. The fact that the consumption of bank-filtered water abstracted from the wells along the Danube continued to grow until the late 1980s was a result of a rapid increase in per-capita water consumption. As predicted by planners around 1970, this was predominantly a consequence of the improved housing standard 17 years of state financed housing development had resulted in.

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379 Keeling, A. M. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" *Urban History Review/Revue d'histoire urbaine* 34(1): p.66

380 Keeling, A. M. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" *Urban History Review/Revue d'histoire urbaine* 34(1): pp.65-67

381 Keeling, A. M. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" *Urban History Review/Revue d'histoire urbaine* 34(1): p.66

Despite Hungary's mounting economic troubles and the negative effect this had on the share of investment in urban infrastructures, FVM was able to maintain the favourable supply conditions. As a result of the planned development of wells, now primarily along the western bank of Csepel Island, water production was able to anticipate demand until the very end of the socialist era. Rather than slowing the pace of production development FVM, in conjunction with Council and central decision-makers chose to abandon the goal of achieving full network coverage in Budapest by 1985.

The development of water production on Csepel in the 1970s and 1980s was fraught with problems. While quality problems had been expected when the integration of these aquifers into Budapest's water supply system, the actual quality of the water was in many places so poor that a significant number of wells had to be left outside temporarily, at least until treatment works could be built. The work of building such facilities was initiated already in the late 1970s.

The main quality problem on Csepel remained the elevated levels of iron- and manganese ions, and as a result of continued research, a better understanding Budapest's water managers gained a better understanding of this problem. However, influenced by the increasing concern over toxins internationally, FVM, KÖJÁL, as well as other concerned parties also conducted research aimed at exploring the susceptibilities of the bank-filtering process to various toxic substances. By the end of the socialist era, as a consequence of the better understanding of bank-filtering these tow lines of inquiry had resulted in, the relationship between bank-filtering and the utilisation of the Danube along Csepel as a sink was being reconsidered.

4.4.1 Increasing Living Standards, Industrial Stagnation and Peaking Water Consumption

Drinking water consumption in Budapest peaked already in 1988, far earlier and at a significantly lower level than expected.[382] This, I would argue, was to a large extent due to the fact that industrial water consumption peaked already in 1979, and

[382] Gilltner, A. (1970) (ed) *Budapest Közmü és Mélyépitési Távlati Terve* (1971-1985), Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága:, table on p, 35 and p.38
Jancsár, P. (ed) (1993) *A 125 éves Fővárosi Vízművek*, Budapest: Fövárosi Vízmüvek: p. 101
Rácz, M. (1998) “A Közmüvek Fejlödése”, in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvk: p.247

then subsequently began declining immediately..[383] The peak coincided with the late 1970s attempt to solve Hungary's economic problems through export growth, and Budapest was the heart of Hungarian export oriented economic activity.[384] The subsequent decline, however was the result of a more complex set of factors. Increased prices and political pressure from central bodies encouraged the introduction of less water intensive technologies.[385] And while the industrial decline of the 1980s also certainly contributed, so, I would argue, did the tertiarisation of Budapest's industries. Due to problems with achieving sufficiently high water quality, FVM's growing production of industrial water did not have much impact.[386]

The fact that overall drinking water consumption in Budapest continued to grow after 1979 was thus a result of continued growth of household consumption, which did not peak until 1989, somewhat above the amount predicted around 1970.[387] The continued and more rapid than expected growth of household drinking water consumption was not primarily a result of the numerical growth of consumers. Both the ratio of the population supplied in 1989 and the size of the population was significantly lower than what the plans drawn up around 1970 predicted.[388]

Rather, the culprit was the faster than assumed growth of per capita drinking-water consumption. 1969 estimates put this at 207 litres per day in 1986, while it in actuality reached about 250 litres by this point, before declining after 1989.[389] As predicted around 1970, the growth of per-capita drinking-water consumption showed a strong correlation with the progress of the housing Program, that is, the increasing number of households which had individual bathrooms. I take the fact that the

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[383] Jancsár, P. (ed) (1993) *A 125 éves Fővárosi Vízművek*, Budapest: Fövárosi Vízmüvek: graph on p. 102

[384] Barata, G. and G. Kukely (2004) "A Budapesti Ipar az Államsocializmusban és Bukása Idején" in: G. Barata (ed) *A Budapest Barnaövezet Megújulási Esélye:* Budapest: MTA Társadalomkutatóközpont: p. 37

[385] Ináncsi, I. (1982) "A VI. Ötéves Terv Elsö Évnek Eredményei, tapasztalatai" Castornamü Infromáció, 1982 (2): p.6
Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvk: p.247

[386] Jancsár, P. (ed) (1993) *A 125 éves Fővárosi Vízművek*, Budapest: Fövárosi Vízmüvek: p. 108, and Károly, A. and Tolani, B. (ed) (2008): *Víz-Rajz: 140 Éve a Főváros Szolgálatában*, Budapest: Fövárosi Vízmüvek -URL: http://vizmuvek.hu/jubileum/pics/konyv.pdf (retrieved 01 June 2011) p. 36

[387] Gilltner, A. (1970) (ed) *Budapest Közmü és Mélyépitési Távlati Terve* (1971-1985), Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: table on p. 35 and Jancsár, P. (ed) (1993) *A 125 éves Fővárosi Vízművek*, Budapest: Fövárosi Vízmüvek: graph on p. 102

[388] Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvk: p. 247

[389] Gilltner, A. (1970) (ed) *Budapest Közmü és Mélyépitési Távlati Terve* (1971-1985), Budapest: Budapest Föváros Tanácsa Végrehajtobizottságának Közmü és Mélyépitési Fögizgatósága: p.43 and
Rácz, M. (1998) "A Közmüvek Fejlödése", in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvk: p. 247

stabilisation of the volume of water consumed by households in the mid 1980s, and the phase out of the housing Program coincided as an argument for this.

However, another important factor was the pricing of water for household consumers. Critique of the volume of household water consumption, and especially the role of price in this was a non issue during the socialist era. Subsidisation of drinking water prices was part of the Kádár regime's policy of keeping the cost of living low, and moreover, high per-capita drinking-water consumption was held forth as an example of "socialist progress", and as mentioned in chapter 2/3 seen as part of a "modern, civilised way of life".[390] .

Although the volume of water consumed never reached the levels predicted by socialist planners around 1970, it is clear that development of the aquifers on Csepel was necessary for ensuring sufficient drinking water for the Hungarian capital. However, as will be discussed in section 4.4.2, the quality of the Csepel waters proved problematic. Despite the fact that this made significant volumes of water undrinkable, FVM managed to stay ahead of demand even as it was burdened with broadened regional responsibilities by central decision-makers.

4.4.2 New Concerns and Old Problems

The reorientation of concerns over drinking which I have described based on North American sources also occurred in Hungary. Some trace of it can already be found in articles published on the risk exposure of Budapest's drinking water sources in the 1970s. This was in the form of mounting concern over the actual and potential effect of the increasingly industrial nature of the wastewaters discharged upstream of and at Budapest. However, as discussed in chapter 3, the impact of industrial effluents on the quality of bank-filtered was until the mid 1970s primarily seen as being of a limited, primarily aesthetic nature. The main concern remained bacteriological risks, and declining aesthetic quality was also seen as negative.

By the mid to late 1970s, the new perspectives on drinking water quality were making themselves more felt in Hungary, also in relation to Budapest's bank-filtered water sources. As Rázc T. et al emphasise in 1976, with reference to the emergence of public water supply as a response to public-health concerns in the 19th century:

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[390] Károly, A. and Tolani, B. (ed) (2008): *Víz-Rajz: 140 Éve a Főváros Szolgálatában*, Budapest: Fövárosi Vízmüvek -URL: http://vizmuvek.hu/jubileum/pics/konyv.pdf (retrieved 01 June 2011) pp. 37-38

> "(A)fter a hundred years, water-quality has once again become a public-health issue in the capital(.....), now the toxic, persistent or semi-persistent organic and non-organic pollutants reaching the public sewers, and in turn the Danube, are increasing the danger. The indicated components – albeit their effects on the human body has not been unequivocally determined - could cause serious illness..."[391]

In other words, toxic industrial pollutants were seen as an increasingly significant source of risk.

The rising concern over toxic risk was reflected in the evolution of the studies conducted by FVM and the KÖJÁL, as well as the development of their laboratories during the 1970s and 1980s.While test aimed at monitoring the toxicity of the Danube and the drinking water supplied by FVM were introduced during the 1970s, and became increasingly comprehensive, regular test were limited to acute toxicity.[392] While this was so, concerns over chronic toxicity were also voiced, however, tests were not mandated by the government, and were irregular.[393] However, concerns over the possibility of persistent toxins , primarily heavy metals, accumulating in the supply system were voiced repeatedly.[394] Moreover, by the mid 1980s there were also concerns that the same reductive conditions that were causing iron-manganese pollution could also lead to the remobilisation of deposited toxins.[395]

The perception of bank-filtered waters as exposed to risk was thus growing due to the industrial pollutants discharged at Budapest. However, the only new type of pollutant detected in concentration above regulation limits and to any significant extent was nitrate pollution. While this was initially thought to be a result of the agricultural runoff polluting the Danube, the origin of the nitrates was found to be from the landward side. Either way, it did result in significant volumes

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[391] Rácz, T. et al. (1976)"A Budapesti Szennyvízelvezetési és Tisztitási Program Megvalósulása" *Hidrologiai Közlöny*, 56 (5): p. 191

[392] Nemédi, Dr. L. et al. (1978) "Hígéneńs Víztoxicologiai Vízsgálatok Bevezetése és azok Tapasztalatai a Fövárosi KÖJÁL-ban" *Budapest Közegészségügy:* 10(1): p.13

Hegedüs, J (1992): "A Duna Víz Mérgezöanyag Tartalma és annak Változása a Föváros Szennyvízei és a Folyam Méregtelenedési Folyamatainak Hatására" *Hidrologiai Közlöny:* 72(1): p. 198

[393] Hegedüs, J. (1986) "A Duna Vízminöségének Vizsgálata Akut és Krónikus Toxicologiai Tesztel" in: *Egészségtuómány:* 30,(2): p. 198

[394] Némedi, Dr. L. (1988) "A Fövárosi Vízgazdálkodás Néhány Környezetegszségügyi Kérdései" *Budapest Közegészségügy*, 20(3): p.73

[395] Benedek, P (1986): "A Duna Vízminöségéröl", *Hidrologiai Közlöny:* 66(4-5): p.198 and 202,

of bank-filtered water having to be left unused.[396]

However, the major problem of water supply in Budapest remained above regulation levels of iron- and manganese-ions. This problem remained limited at Szentendre, and remained associated with changes in the current and the bank topography which increased the deposition of sludge.[397] However, at Csepel, the problem grew in extent. Contrary to what had been hoped for, as the establishment of new waterworks based on bank-filtered wells progressed, elevated iron- and manganese-ion problems were encountered in new areas. P. Janscár offers the following characterisation of the Csepel aquifers in his history of FVM published for the 125 jubilee: "The abstractable water is poorer than that of Szentendre Island, iron- manganese-pollution can be found almost everywhere in it."[398]

The Ráckeve waterworks, along Csepel's eastern bank, the first stage of which was developed between 1977 and 1984, "was already from the outset built together with a water treatment works with ozone-oxidation and rapid sand filtering."[399] This ozone treatment works had a capacity of 150 000 m^3/d, equivalent of about 40% of the water abstracted from all of Csepel at that point.[400] However, as wells were developed during the 1980s, further wells were found to contain excessive amounts of iron- and manganese-ions.[401]

By the end of the socialist era in Hungary, the volume of drinking water abstracted from the wells on Csepel Island reached 390 000 m^3/d, in 1993 21,1% of the water consumed in Budapest.[402] In addition, 40 000 m^3/d was not utilised for human consumption due to low quality. Plans for an additional 150 000 m^3/d ozone treatment works had been drawn up during the late socialist era, and this had been completed by 1996.[403]

Thus, by 1996 around 76% of the water abstracted from Csepel was

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396 Budapest Technical University, Department of Water and Waste-water Engineering, (1993) Wisnovszky, I. (ed) *Integrated Water Resource Management of Budapest and the Surrounding Areas*, Római Kiadó és Nymodaipar: p. 46

397 Némedi, Dr. L. et al. (1991) "A Partiszürésü Kutak Vízminösége Budapest Térségében a Tervezet Nagymarosi Erömü Épitése Elötti Években (1986-1990)", in: *Budapest Közegészségügy*, 23(2): p.38

398 Jancsár, P. (ed) (1993) *A 125 éves Fővárosi Vízművek*, Budapest: Fövárosi Vízmüvek: p. 105

399 Jancsár, P. (ed) (1993) *A 125 éves Fővárosi Vízművek*, Budapest: Fövárosi Vízmüvek:, p. 62

400 Károly, A. and Tolani, B. (ed) (2008): *Víz-Rajz: 140 Éve a Főváros Szolgálatában*, Budapest: Fövárosi Vízmüvek -URL: http://vizmuvek.hu/jubileum/pics/konyv.pdf (retrieved 01 June 2011) p. 85

401 Jancsár, P. (ed) (1993) *A 125 éves Fővárosi Vízművek*, Budapest: Fövárosi Vízmüvek: p. 62

402 Cséry, P. (1993) "125 Éves a Fövárosi Vízmüvek" *Vízmüpanorama:* 1(1): p.28

403 Károly, A. and Tolani, B. (ed) (2008): *Víz-Rajz: 140 Éve a Főváros Szolgálatában*, Budapest: Fövárosi Vízmüvek -URL: http://vizmuvek.hu/jubileum/pics/konyv.pdf (retrieved 01 June 2011) p. 85

subjected to ozone treatment, significantly raising the cost of water production. I would argue that the rising cost of water production ozone treatment entailed is what Dr. Nemédi et al. in 1991 referred to when they in their article reviewing the functioning and problems of bank-filtered water production in Budapest state: "The growing quantities of iron and manganese ions indicates that the basic advantages of bank-filtering are endangered."[404] That is, that the low cost/quality ratio of bank-filtered waters were one of its main advantages, and that this was now disappearing as ozone treatment became necessary.

However, it would also seem as if the almost universal presence of iron-manganese problems on Csepel led to a reconsideration of what caused this problem. Bíró and Hajdú's insistence on the significance of washed versus unwashed banks as a decisive factor in relation to the deposition of sludge responsible for the reductive conditions, as discussed in chapter 3, is not mentioned in Dr Nemédi et al.'s otherwise exhaustive article. Moreover, in their book on Budapest's water management from 1993, Wisnovszky et al., the occurrence of anaerobic, that is reductive, conditions in the filtering zone is ascribed to"..the increasing organic load and to the thus decreased dissolved oxygen concentrations;"[405]

In other words it seems as if not just sludge deposition, but also the reduced oxygen content of the water, and thus the organic loading of the Danube below in general was seen as causing the iron manganese problems. However, also these perceptions of what caused the iron- and manganese-ion problems proved to fall short of the full truth. By 2008, in the company history published for FVMs 140 year jubilee, a more up to date explanation was presented in which in addition to anaerobic conditions, microbes were presented as part of the cause. Thus, the utilisation of the Danube's intrinsic processes to neutralise municipal and industrial wastes was even more directly implicated in the degradation of the bank-filtered waters of Csepel.[406]

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[404] Dr. Némedi, L. et. al. "The Quality of Water in the Bank-Filtered Wells in the Budapest Area in the Years Prior to the construction of the Nagymaros Hydroelectric Dam (1986-1990)", in: *Budapest Közegészségügy*, vol XXIII, no. 2, 1991, pp.38-46,p.42

[405] Budapest Technical University, Department of Water and Waste-water Engineering, (1993)(ed) Wisnovszky, I,: *Integrated Water Resource Management of Budapest and the Surrounding Areas*, Római Kiadó és Nymodaipar p. 53

[406] Károly, A. and Tolani, B. (ed) (2008): *Víz-Rajz: 140 Éve a Főváros Szolgálatában*, Budapest: Fövárosi

As I will discuss in the following sections, although these were not published widely during the 1980s, by the end of the socialist era these new perspectives regarding risks and their causes had thus led to concrete conflicts between the source and sink functions of the Danube utilised by Budapest. Although this limited the volume of water available for FVM to satisfy the water demand of Budapest, due to how drinking-water consumption developed, this did not become a problem. Neither did the increased costs of water production the need for ozone treatment caused.

4.5 The Consumption of the Danube as a Sink

The Program, accompanied by an increased focus on industrial pre-treatment, was conceived as a precautionary solution to the expected deterioration of the quality of water in the aquifers on Csepel, as well as other functions of the Danube in Budapest dependent on good surface water quality. While the industrial, household as well as institutional wastewater loads were expected to rise significantly, the implementation of these twin pollution abatement strategies was planned to offset this, and thus to be the main factor determining the collective impact of Budapest's wastewaters on the quality of the Danube.

This attempt at avoiding an expected use conflict, as I mentioned in chapter 3, I see as an attempt at developing the use of the Danube as a natural resource in a planned manner. As such, these planned measures fit well with the aims of halting the degradation of the Hungarian environment and subsequently improving its quality, which as I have discussed in section 4.2.2.1. However, most certainly the Program, and to some extent also industrial pollution abatement, were long term projects, just as the deterioration of the water in the Csepel aquifers was a long term prospect. Thus, in the interim, the utilisation of the Danube's intrinsic properties as a river to do the work of neutralising and removing the liquid wastes of Budapest was to continue, albeit with decreasing intensity, as the planned technical technological substitutes were completed.

Thus, during the period from the mid 1970s to the late 1980s covered in this chapter, two processes were central in determining the intensity of loading the Danube's capacities as a sink were subjected to as a result of wastewater discharges

Vízmüvek -URL: http://vizmuvek.hu/jubileum/pics/konyv.pdf (retrieved 01 June 2011) p. 50

from Budapest. On the one hand, how the processes generating pollutant laden wastewaters changed as part of Budapest's development, and how this affected the volume, but most significantly the quality of the effluents discharged. On the other, the progress of pollution abatement, that is, how much of the pollutant load was treated, and how effectively.

However, due to the number of sites at which wastewater was generated and discharged in Budapest, discussing how the volume and quality of individual dischargers changed over time and moreover how these individual discharges affected the Danube is beyond the scope of this thesis. In order to get around this problem I will for the most part limit my discussion to what was achieved in terms of the development of municipal and industrial treatment.

As I will demonstrate in this section, the intended phase out of the utilisation of the Danube's intrinsic processes for treatment did not progress as planned. Thus, these pollution abatement strategies did not result in as significant as intended reduction of the strain on the Danube's perceived capacities for neutralising the pollutant content of Budapest's wastewaters. In terms of approaching a quantification of the strain the wastewaters discharged from the Hungarian Capital constituted on the perceived capacity of the Danube as a sink, I will base this on two interrelated sources of information. First I will recount how surface water quality, which despite the limited success in implementing treatment stabilised and in some respects even improved by the end of the 1980s. Then I will move on to look at how the intensity of the utilisation of the Danube as means of neutralising pollutants was perceived in relation to how the perceived limits of the Danube as a sink, and how the latter was defined.

4.5.1 Treatment: Economic crisis and Divergence from the Planned Phase out of the Danube as a “Wastewater Treatment Machine”

In this section I will look at how the growing economic troubles in Hungary in the 1970s and especially the 1980s affected the progress of the Program and the implementation of industrial pre-treatment. As I defined it in chapter 3, the former is a concrete example of the attempted integration of the environment as a significant factor in socialist planning, in this case the planning of urban development. The latter, on the other hand, while of course also being a part of this overall planned effort, will

also serve as a concrete example of how the efforts of the socialist regime in the field of environmental regulation failed to result in the intended and planned outcomes.

By the late 1980s, the negative consequences of the lack of progress these complementary pollution abatement strategies was downplayed by several actors. In other words, much in the same way as the failure to accomplish the goals set out in Budapest's ÁRTs had been approved by later revisions of plans, also in terms of wastewater treatment the implementation gap received retroactive approval. As I will argue in detail in section 4.6, I see this as a joint consequence of the by then critical condition of the Hungarian economy and the perceived relation between the two organic machines on which Budapest's water management rested.

4.5.1.1 The Program: Delays and Postponements

The Program suffered delays already from the outset. FCSM did not receive sufficient funding during 1974 and 1975, nor were there available capacities in the construction industry and other industries FCSM relied on for supplies to implement the Program. Thus, the pace had to be adjusted accordingly.[407] As I see it, the fact that the scheduling was adjusted almost immediately even though the program had been drawn up with reference to the expected "carrying capacity" of the plan economy is a clear indication that the "carrying capacity" was seen as having been reduced. This dynamic was to prevail also during the 1970s and 1980s. As T. Rácz stated in his article on the development of the Program and the difficulties and prospects of implementing it in 1976: "In the historical development of water-quality protection in the capital(.....)*the economic factor has always been decisive*." (original italics).[408] Thus, as the "carrying capacity" of the economy deterirated further during the late 1970s and even more so during the 1980s, the Program was rescheduled time and time again.

As J.A. Tarr emphasised, in his *The Search for the Ultimate Sink*, in the U.S. in the early 20th century, due to the lack of obvious direct benefit at the site of discharge, "...municipalities resisted installing sewerage treatment facilities..."[409] As long as

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[407] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p. 29

[408] Rácz, T. et al. (1976)"A Budapesti Szennyvízelvezetési és Tisztitási Program Megvalósulása" *Hidrologiai Közlöny*, 56 (5): p.191

[409] Tarr, J. A. (1996) *The search for the ultimate sink : urban pollution in historical perspective*, Akron, Ohio: University of Akron Press, p. 13

there were no excessive local problems, in terms of nuisances or public health risks, the high expense of sewerage treatment made it easy for municipalities to postpone such investments.[410] As I see it,the following quote from T. Rácz's 1976 article, in which he comments on the initial difficulties with the implementation of the Program, he addresses this issue in a Hungarian context:

> "Among the types of public works wastewater treatment is the one which – unfortunately – the implementation of can be postponed the longest. It is not generally developed due to direct demands from the populace or industry, its requirement is rather brought forth through the measurements, warnings and findings of specialists. If public opinion is for the implementation of waste-water treatment, there is generally something wrong; fish kills, or in very serious cases, epidemics."[411]

During the process of drawing up the V five year plan, FCSM came to an agreement on future funding levels with the Public works and Civil Engineering Directorate of the Municipal Council, the basis on which plans were drawn up until 1990. The new funding levels agreed upon entailed a further reduction of the pace, as rather than the 5 billion HUF per five year plan period on which the original 1974 schedule had been based, FCSM was now to make do with four.[412] However, plans were adjusted again, as the actual plans for the V five year (1976-1980) plan only awarded FCSM 2,9 billion HUF. Moreover, of this only 2,4 billion, 83% of the planned was actually invested, causing further delays.[413]

According to the VI five year plan (1981-1986), the investments meant to go towards realising the Program were to be increased to 4,5 billion, but of this 3,3 billion were awarded, 73% of the planned amount.[414] In an article published in the middle of this plan period on the long-term questions of water supply and sewerage in Hungary, M. Varga explains that the lower level of funding for STWs was one of the

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[410] Tarr, J. A. (1996) *The search for the ultimate sink : urban pollution in historical perspective*, Akron, Ohio: University of Akron Press, p. 13

[411] Rácz, T. et al. (1976)"A Budapesti Szennyvízelvezetési és Tisztitási Program Megvalósulása" *Hidrologiai Közlöny*, 56 (5): p.191

[412] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p. 25 and 31

[413] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.50

[414] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.50

"...consequences of the severe reduction in the availability of investment instruments..", that is, the austerity measures of the early 1980s.[415] Moreover, that STW development "...has been characterised by the fact that it has always been the first thing to be removed from development plans if the investment opportunities "narrowed"."[416]

By the start of the 7th five year plan period, as with the planned large scale investments in the urban infrastructures of Budapest in general, also the Program was halted as a result of the deepening economic crisis.[417] By that time, as I Oszlayi put it in 1985, "(b)ecause of the economic problems of the later years, today there is a ten year delay in the implementation of the Program."[418] Commenting on this delay, M Varga stated that catching up with this lag was only realistic on a 15-20 year time scale, that is, between 2000 and 2005.[419] Moreover, as in 1983, he emphasised that the cause of the delays were "... in part the view of the public of wastewater treatment as something which can be postponed.."[420].

Overall only 42% of the sewerage infrastructure planned for the 1976-1986 period had been completed, and in terms of treatment capacity only 36% of the targets set had been met.[421]However, the two projects considered most important, if we take their positions first on the schedule as an indication of importance, the expansion of the South-Pest STW, and the construction of the North-Pest STW, albeit only its first stage, had been completed. The 42 000 m^3/d increase of the former to 72 000 m^3/d between 1977 and 1984, and the 140 000 m^3/d of the latter by 1986, all in all enough to treat about 22% of Budapest's wastewater discharges in 1986.[422]

However, there were other shortcomings which were significant for the

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[415] Varga, M. (1983) "A Vízelátás- és Csatornázás Távlati Kérdései" *Hidrologiai Közlöny*, 63(9): p. 382

[416] Varga, M. (1983) "A Vízelátás- és Csatornázás Távlati Kérdései" *Hidrologiai Közlöny*, 63(9): p. 384 (asterisks in original)

[417] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.50

[418] Oszlayi, I. (1985): "Szennyvízek a „Purgatoriumban": Negyvenmillárdos Program" *Budapest*, 1985, 23(6): p.9

[419] Varga, M. (1986) "A Vízellátás és Csatornázás VII. Ötéves Tervi Fejlesztési Koncepcijója" *Hidrologiai Közlöny;* 66(3): p. 123

[420] Varga, M. (1986) "A Vízellátás és Csatornázás VII. Ötéves Tervi Fejlesztési Koncepcijója" *Hidrologiai Közlöny;* 66(3): p. 124

[421] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p. 49

[422] Budapest Technical University, Department of Water and Waste-water Engineering, (1993) Wisnovszky, I. (ed) *Integrated Water Resource Management of Budapest and the Surrounding Areas*, Római Kiadó és Nymodaipar, p. 100

utilisation of the Danube as a sink. Only 53% of the planned intercepting and main sewers had been built.[423] Most significantly, large sections of the bankside intercepting sewer on the Buda side, on the drawing board for more than a century, had not yet been built, entailing that untreated sewerage continued to flow from open drains in the city centre.[424] Another important shortcoming was that the lack of progress with the laying of sewer mains in the catchment of the North-Pest STW, which entailed that only 69,4% of its capacity could be utilised in 1986.[425]

4.5.1.2 Reasons For Industrial Treatment

Industrial pre-treatment was as mentioned in chapter 3 not a part of the Program. Rather, advances in industrial pollution abatement were to be achieved through the enforcement of environmental regulations, and the sanctions and incentives the various bodies responsible for enforcement could apply to encourage industrial enterprises to pollute less.[426] The protection and improvement of surface water quality was the most obvious reasons for the Kádár regime to encourage industrial pre-treatment. Moreover, for both the central government and the Municipal Council of Budapest the concern over the potential risks industrial pollutants represented to human health through the bank-filtered wells downstream at Csepel. However, there were also other reasons, more related to economic concerns. These were the protection of the sewerage system from the damages and difficulties industrial pollutants might cause, and the conservation of raw materials.

Public sewers were mostly seen as a means of collecting municipal, and during the 1960s and 1970s to an increasing extent industrial, wastewaters and discharging them into the Danube. However, in addition to its role in ensuring that the mixed wastewaters discharged from the conformed to the standards prescribed in the Wastewater Regulations enforced by OVH, the increasingly extensive and complex sewerage infrastructure made its own demands in terms of the quality of industrial effluents drained through it. In heavily industrialised cities like Budapest, the

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[423] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p. 49

[424] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p. 48

[425] Mattyasovszky, J. et al. (1990) *Budapest csatornázása, 1972-1986*, Budapest:Datacoop Kisszövetkezet: p.50

[426] Enyedi, G and V. Zentai (1987) “The Hungarian Peoples Republic”, in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham p.222

establishment of a separate Sewerage Regulation with its own limits in the late 1960s, enforced by the local sewerage authority, in Budapest's case FCSM, was an important step ahead.

Substances for which there as yet did not exist limits in the OVH enforced Wastewater regulations, as these were not seen as harmful for living waters at the time, were problematic for FCSM. This is reflected, at least superficially, in the differences in the numbers of pollutants and toxins covered by the two different regulations around 1986; 18 pollutants and 13 toxins were covered by the Wastewater regulations, 10 pollutants and 17 toxins by the sewerage regulations.[427] The substances to which special attention was given in the Sewerage Regulations were typically ones which could potentially impede the operation of infrastructures, damage these, or in the most extreme cases endanger the health and even lives of FCSM employees.[428] Moreover, agricultural and sylvicultural utilisation of wastewater sludge as fertilizer was high on FCSM's agenda, and in addition to in general making biological wastewater treatment difficult, industrial wastes also

While water quality management was the main reason for the intensified focus on industrial the treatment of industrial wastewaters, an additional concern can also be found in the articles published on this subject in the 1970s. As Zsuzsa Gille has elaborated on in her work, until the 1980s when this gradually proved to be impractical and in many cases hazardous, Hungarian waste management was quite heavily oriented towards recirculation of by-products and wastes, in what she called "a cult of waste". The aim was to reuse as much as possible of valuable raw materials, and in many cases when practical ways of doing this was not available these materials were stored for a time when processes allowing their reintegration into processes and products would be possible.[429]

In FCSM's survey of the status of industrial wastewater treatment published in 1977 the objective of resource conservation and the utilisation of wastes figures heavily among the arguments for improved industrial pretreatment.[430] Among the

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[427] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p.227

[428] Szabó, Dr. Z.né, (1978) "Általános tájekoztató a Föváros Ipari Szennyvizhelyzetéröl" *Csatornmü Információ*, 1978(2): pp. pp. 28-29

[429] Gille, Zs. (2007) *From the Cult of Waste to the Trash Heap of History: The Politics of Waste in Socialist and Postsocialist Hungary,* Bloomington: Indiana University Press

[430] Szabó, Dr. Z.né, (1978) "Általános tájekoztató a Föváros Ipari Szennyvizhelyzetéröl" *Csatornmü*

arguments for reclaiming raw materials from wastewater was import-substitution, in relation to such imported raw materials as lanolin and various heavy metals not produced in Hungary.[431] I would argue that this could be seen as a way of portraying wastewater treatment, traditionally categorised as "non-productive" investments, as an economic advantage. Especially in the contex of the mid to late 1970s, when Hungary's foreign trade balance was deteriorating and import substitution was high on the agenda.[432]

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4.5.1.3 **Enforcement:** The Failure of Incentive based Environmental Policy

As mentioned in the above section on environmental policies in general, while the 1976 Environmental Act provided the central government and the various levels of with a broad set of sanctions to enforce compliance with environmental standards, only one of these enforcement tools, the imposition of fines for breach of emission standards, were used with regularity. As Enyédi and Zentai portrayed it, fines were intended to serve a dual purpose; On the one hand they were to "...form(..) appropriate behaviour.." by making it costly to continue environmentally damaging behaviour. On the other, the fines were intended as, or at least were used as a means of accumulating funds which could then under central-government control be invested in the "development of the environment" in a wide sense. The Water Management Fund, established in 1976, fulfilled this role for both water supply, sewerage, as well as municipal and industrial wastewater treatment.[433]

According to Enydi and Zentai, and also later publications on the issue, such as E. Mistéth claim that these fines, due to their low level and the "softness" of the budget constraints in Hungary did not work as intended. As the latter put it in 1993, "The waste water fine in Hungary proved to be ineffective."[434] However, reading Dr

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Információ, 1978(2): pp. 20-30, p. 22, 23, 25 and 27

[431] Szabó, Dr. Z.né, (1978) "Általános tájekoztató a Föváros Ipari Szennyvizhelyzetéröl" *Csatornmü Információ*, 1978(2): pp. 27

[432] Szabó, Dr. Z.né, (1978) "Általános tájekoztató a Föváros Ipari Szennyvizhelyzetéröl" *Csatornmü Információ*, 1978(2): pp. 27 and

Szalai, E. "Libikóka: Gazdasági Mechanizmus és Nagyválalati Értékek" in F. Nikosz and A. Örkény(ed) *Magyarország Társadalomtörténete 1945-1989: 2*, series editor: I. G. Kovács: Budapest: Új Mandátum Könyvkiadó, p.295

[433] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p.222

[434] Mistéth, E. (1993) "A Magyarországi Duna-szakasz" *Hidrologiai Közlöny*: 73(1): p.9

Z. Szabó's account of the development and results of FCSM's apparatus for inspecting and fining industrial enterprises discharges to Budapest's municipal drainage network from 1977, a more nuanced picture seems to appear. Although at this point only the major polluters had been registered, progress between 1970 and 1976 was rapid.

Moreover, in her 1978 article Dr. Szabó presents an account of a number of factories in the food processing, mechanical engineering, textile, light industrial and chemical branches of Budapest's industries. These were arguably some of the most polluting at that point, a distinction they would have the dubious honour of maintaining until the end of the socialist period. According to Dr. Szabó, FCSM's work in inspecting these enterprises and the fines imposed on those discharging wastewaters in breach of the Sewerage Regulations were in many cases having the desired effect. During the 1970s the pollutant load of many of these factories had been significantly reduced through the construction of often quite simple treatment installations or changes in production processes.

However, most enterprises that had achieved progress in terms of effluent quality were still being fined, as they were still in breach of the relevant standards, and FCSM's experts saw it as possible to improve the quality of effluent further. Continued quality problems stemmed either from lacking stages of treatment, such as settlement tanks for capturing heavy metals or grease traps, due to the outdated standard of the technologies employed, from incorrect operation or overloading of treatment installations.[435] In relation to the two latter, in another article from the same year, Dr. Szabó states that "(a)nother very serious problem with pre-treatment installations is the question of their proper operation. At manufacturing plants, they neglect wastewater treatment tasks in favour of productive tasks."[436]

The question of whether or not practical technical solutions for improvement of wastewater quality existed was an important factor when fines were imposed by FCSM. If no such solution existed for a certain type of effluent, the enterprise could negotiate with FCSM over "individual standards", or if you will, exceptions from the effluent standards. Being awarded such concessions were in most cases predicated upon having improved the quality of the discharged wastewater as much as

[435] Szabó, Dr. Z.né, (1978) "Általános tájekoztató a Föváros Ipari Szennyvizhelyzetéröl" *Csatornmü Információ*, 1978(2): pp. 20-30

[436] Szabó, Dr. Z.né, (1978) "Általános tájekoztató a Föváros Ipari Szennyvizhelyzetéröl" *Csatornmü Információ*, 1978(2): p.32

practically possible.[437]

A further problem was the disposal of the often toxic sludge which resulted from industrial wastewater treatment. No regulations existed regarding hazardous waste-disposal in Hungary, nor were there any appropriate facilities for the disposal of such wastes in the Budapest area. As a result of this toxic sludge from among others galvanisation, with high heavy metal content, and chemical industries in one way or another ended up back in the public sewers and thus subsequently the Danube or at FCSM's biological treatment facilities.[438]

Although there was thus some progress in the construction of treatment facilities and subsequently, in the quality of industrial effluents in the early 1970s, some, as Dr. Szabó puts it "...prefer(ed) to deal wastewater treatment on a legal basis."[439] That is, rather than construct treatment facilities to avoid further fines, they sought exemptions from the standards from the outset. A prime example of this was the massive Budapest Vegyimüvek (Budapest Chemical Works), which in 1977 were paying fines in the order of millions each year.[440]

My sources only cover the treatment of the industrial wastewaters reaching the Danube through the public drainage network operated by FVM. However, I would argue that as OVH's and FCSM's systems of inspections and fines were not all that different, similar progress was most likely achieved also with direct discharges into the Danube. It is however important to note that, this initial progress happened during the height of the Hungarian socialist regime's efforts to promote environmental protection, as I have discussed in section 4.1. Moreover, until 1978 the socialist regime chose to ignore the changing international climate and the Hungarian industrial sectors need for readjustment.[441] Thus, on the basis of funds borrowed from abroad there seemed like there was funds for environmental investments.

The initial progress of the 1970s did not continue into the 1980s. The basic problems in terms of lacking infrastructure and the incorrect operation or neglect of

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[437] Szabó, Dr. Z.né, (1978) "Általános tájekoztató a Föváros Ipari Szennyvizhelyzetéröl" *Csatornmü Információ*, 1978(2): pp.28-29

[438] Szabó, Dr. Z.né, (1978) "Általános tájekoztató a Föváros Ipari Szennyvizhelyzetéröl" *Csatornmü Információ*, 1978(2): p.27

[439] Szabó, Dr. Z.né, (1978) "Általános tájekoztató a Föváros Ipari Szennyvizhelyzetéröl" *Csatornmü Információ*, 1978(2): no.2, Budapest, pp. 20-30, p. 29

[440] Szabó, Dr. Z.né, (1978) "Általános tájekoztató a Föváros Ipari Szennyvizhelyzetéröl" *Csatornmü Információ*, 1978(2): p. 29

[441] Swain, N. (1992): *Hungary : the rise and fall of feasible* socialism: London: Verso, p.130

the ones built, as described by Dr. Szabó in 1977 persisted . However, in terms of the possibilities for further improvement, the situation became more problematic. In summarising the effects of the austerity measures implemented from 1981 on environmental investments at the national level, Enyédi and Szirmai emphasise that the austerity measures led to "... serious restrictions on investments and imports."[442] What resources were available were primarily devoted to productive investments in order to effect an as swift as possible economic recovery.[443]

That this entailed decreasing possibilities and focus on pollution abatement is obvious from the declining level of ambition in terms of the overall targets environmental targets, which I have discussed in section 4.2.2. As Dr. Varani presented it in 1988 in an article on the effects of toxic industrial discharges on FCSM's activities, the increasingly narrow scope for investment from 1981 on entailed that essential environmental investments in the industrial sector in Budapest were postponed.[444]

By 1982, according to Seregi, fines and inspections were no longer seen as an effective incentive for industrial enterprises to improve their effluent quality by FCSM. The fines were considered to be as too low in relation to the damages caused, inspections were relatively easy to avoid, and if the load of accumulated fines became to heavy to bear, many enterprises would turn to higher authorities for help, that is, deletion of debts.[445] As Enyédi and Zentai emphasise, the primary concern was still meeting production targets, and the performance of enterprises was not evaluated on the basis of their achievements in terms of wastewater treatment.[446] While fines were imposed, the approach of the state to this issue, as Enyédi and Zentai put it, was not especially strict.[447]

While statements regarding the priority of halting environmental decline in the

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[442] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham p. 229

[443] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham p. 229

[444] Varnai, Dr. I: (1988) "Ipari Tevékénysgböl Származó Toxicus Szennyezések Hatása, Következménye a Közmüves Szennyvíztisztitásra, Iszapkezelésre és Elhelyezésre", in C*satornamü Informnáció:* 1988(2-3): p.3

[445] Seregi, L. (1982) "Piszkosan Jön – Piszkosan Megy" *Budapest:* (20)11: p.12

[446] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p.224

[447] Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p.223

bigger cities and attenuated water quality areas were restated time and time again, very little happened in terms of industrial wastewater treatment in Budapest.[448] According to Dr. Varnai's 1988 article "..the situation in the Capital in terms of industrial wastewater treatment is worse than in the rest of the country."[449]

While this might have had a lot to do with the larger scale of the task in Budapest, seeing as the number and size of its enterprises was the greatest in Hungary, I would also argue that this has to do with the Hungarian economic mechanism, as discussed in section 4.2.2. It would seem to me as if both the granting of exemptions from the Wastewater and Sewerage Regulations as well as the deletion of pollution related fines were subject to bargaining, or rather, to central intervention, based on Dr. Szabó's and Varnai's articles. According to Swain, size conferred advantages in terms of the enterprise's bargaining position vis a vis central bodies. Budapest had Hungary's greatest concentration of large enterprises, which used their advantageous bargaining position in many other ways.[450] Taking this into account, it would seem likely to me that they also used their connections to justify delaying environmental investments as well as avoiding fines.

In 1988 Budapest had about 2500 industrial plants, which together discharged approximately 603 000 m^3 wastewaters each day.[451] Of these only 300 had facilities for treating their wastewaters. Moreover, of these around half had been built before 1970, and were thus in many cases the same installations that Dr. Szabó had pointed to as a problem in 1977.[452] Outdated technology, malfunctions, overloading and the lack of treatment stages was still characteristic of these.[453] Thus, only 15% received

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448 Enyedi, G and V. Zentai (1987) "The Hungarian Peoples Republic", in G. Enyedi, A.J. Gijswijt and B. Rhode (ed) *Environmental Politics in East and West,* London:Taylor Graham: p.221

449 Varnai, Dr. I: (1988) "Ipari Tevékénysgböl Származó Toxicus Szennyezések Hatása, Következménye a Közmüves Szennyvíztisztitásra, Iszapkezelésre és Elhelyezésre", in C*satornamü Informnáció:* 1988(2-3): p. 5

450 Barata, G. and G. Kukely (2004) "A Budapesti Ipar az Államsocializmusban és Bukása Idején" in: G. Barata (ed) *A Budapest Barnaövezet Megújulási Esélye:* Budapest: MTA Társadalomkutatóközpont: pp.38-39

451 Varnai, Dr. I: (1988) "Ipari Tevékénysgböl Származó Toxicus Szennyezések Hatása, Következménye a Közmüves Szennyvíztisztitásra, Iszapkezelésre és Elhelyezésre", in C*satornamü Informnáció:* 1988(2-3): p. 5 and
Budapest Technical University, Department of Water and Waste-water Engineering, (1993)(ed) Wisnovszky, I,: *Integrated Water Resource Management of Budapest and the Surrounding Areas*, Römai Kiadó és Nymodaipar: p. 104

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453 Budapest Technical University, Department of Water and Waste-water Engineering, (1993)(ed) Wisnovszky, I,: *Integrated Water Resource Management of Budapest and the Surrounding Areas*, Römai Kiadó és Nymodaipar: p.104

sufficient treatment, while a further 15-20% received partial treatment.[454] Of the wastewaters discharged through the public sewers 30-40% contained pollutant concentrations above the limits prescribed by the Sewerage Regulations. 500-600 of the plants in breach of regulations discharged their effluents through the public sewers.[455]

In terms of industrial branches and types of pollutants in question, those still problematic in 1988 were to a large extent those which Dr. Szabó emphasised in her 1977 article. In most of the heavily polluting branches, such as machine tooling, chemicals, pharmaceuticals, and the leather industry, as well as the food processing industries, treatment was still at best partially resolved. Those installations which existed were in many cases dependent on careful operation in order to function properly.[456] The disposal of toxic sludge was still not resolved, although new regulations had been drawn up for this. An immediate result of this was that as in 1977, toxic sludge was either discharged into the sewerage system, or treatment facilities were not utilised. The latter was the case in the leather industry, where new, modern treatment facilities had been built by the mid 1980s, but were not operated.[457]

Thus, looking at the achievements in terms of reducing the pollutant load discharged by the households, institutions and industries of the Hungarian capital, although some progress was made, it fell well behind the planned targets. Moreover, treatment facilities did nothing to counter the problem of non-point source discharges in Budapest. As a result of the low funding of sewerage development, plans for the construction of storm-water settlement tanks which were to counter the peaking of the pollutant load during heavy rainfalls were not implemented. Thus, the heavy air pollution in Budapest continued to affect surface water quality in Budapest negatively as stormwaters washed the settled pollutants into the sewers. In fact, according to

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454 Varnai, Dr. I: (1988) "Ipari Tevékénysgböl Származó Toxicus Szennyezések Hatása, Következménye a Közmüves Szennyvíztisztitásra, Iszapkezelésre és Elhelyezésre", in C*satornamü Informnáció:* 1988(2-3): p. 5

455 Budapest Technical University, Department of Water and Waste-water Engineering, (1993)(ed) Wisnovszky, I,: *Integrated Water Resource Management of Budapest and the Surrounding Areas*, Római Kiadó és Nymodaipar: p. 104

456 Budapest Technical University, Department of Water and Waste-water Engineering, (1993)(ed) Wisnovszky, I,: *Integrated Water Resource Management of Budapest and the Surrounding Areas*, Római Kiadó és Nymodaipar: p. 104

457 Budapest Technical University, Department of Water and Waste-water Engineering, (1993)(ed) Wisnovszky, I,: *Integrated Water Resource Management of Budapest and the Surrounding Areas*, Római Kiadó és Nymodaipar: p. 104

Wisnovszky and his colleagues at the Budapest Technical University, in 1993 "this represent(ed) the most sever environmental threat to surface waters" in Budapest.[458]

4.5.2 The General Strain On the Danube as a Sink

As a result of the delays in the implementation of the Program and the failure of the regulatory and incentive based approach of the Kádár era to force Industrial enterprises to spend scant funds on pollution abatement, the latter to a large extent due to the lacking application of force, the Danube remained the primary means of wastewater treatment in Budapest until the end of the socialist era. However, despite this surface water quality had by 1989 been stabilised, in accordance with the overall policy aim for water quality protection in the 7th five year plan.

Water quality continued to deteriorate at least until 1980. While the water arriving at Budapest also declined in quality between 1970 and 1980, especially in terms of bacteriological parameters, the Szentendre reach still continued to enjoy some of the highest water quality of the Hungarian Danube. As a result of the intense and still intensifying discharges along both banks in Budapest, the Cseple reach remained the most intensively polluted section of the Danube in Hungary. [459]

Between 1980 and 1989, however, the strain on the Danube's perceived capacity for self-purification at Budapest stopped increasing. Water quality downstream of the Hungarian capital stabilised, and even improved in some respects. According to I. Wisnovszky and his colleagues at the Budapest Technical University, between 1979 and 1993, the water quality of the Danube just downstream of Budapest developed in the following manner; Chemical and biological oxygen demand declined, the most classical indicators of the intensity of self-purification processes; The concentration of phosphates and ammonium also declined, chemicals most commonly associated with agricultural runoff; Dissolved oxygen and total hardness stabilised. However, in terms of some indicators, nitrate, total nitrogen, saprobity index, and total dissolved solids, the quality of the Danube's water

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[458] Budapest Technical University, Department of Water and Waste-water Engineering, (1993)(ed) Wisnovszky, I,: *Integrated Water Resource Management of Budapest and the Surrounding Areas*, Római Kiadó és Nymodaipar: p.

[459] Bulla, Dr. M. (1989) *Tanulmányok a Hazánk környezeti állapotárol:* Budapest: Környezetdgazdálkodási Intézet: p.58

Csanády, M. (1994) "A Duna Vízminösgének Higiénés Értékelése" in *Hidrologiai Közlöny*, 74(5): figure 1-6, pp. 294-295

continued to decline.[460] The decline continued also in terms of bacteriological parameters, and microbiological pollution remained much worse than chemical quality.[461]

Looking at the timing of this positive development in the strain on the Danube's perceived pollutant neutralising capabilities, I would argue that the contribution of the meagre progress in the construction of municipal and industrial wastewater treatment facilities to this was limited. The initial progress achieved in the 1970s as a result of the efforts of the FCSM and OVH administered system of wastewater inspections and fines most likely contributed somewhat in terms of reducing the loading of the Danube with pollutants of industrial origin.

The completion of the North-Pest STW in 1986 and the reduction in the biodegradable and oxidisable load most likely contributed to the decline of BOD and COD. However, as the continued growth of bacteriological pollution indicates, the problems related to household wastewater discharges continued. Moreover, the main reasons for the growing impact of household wastewaters, the modernisation of the housing stock and the increasing prevalence of individual modern sanitary facilities in each household, as well as the number of households connected in general, continued to grow.

Thus, I would argue that the industrial load was what was reduced the most. However, as progress in terms of industrial treatment stagnated in the 1980s, there must be other factors involved. The improvements achieved in terms of industrial water conservations, which entailed extensive recirculation of lightly pollutant laden wastewaters, as well as redesign of production processes with input conservation in general as an aim.[462]

It is conspicuous that the stagnation and eventual decline of Budapest's industries as a result of Hungary's economic troubles happened coterminously with the stabilisation and eventual improvement of surface-water quality within and downstream of Budapest. Industrial production declined by slightly more than 10% in

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[460] InBudapest Technical University, Department of Water and Waste-water Engineering, (1993)(ed) Wisnovszky, I,: *Integrated Water Resource Management of Budapest and the Surrounding Areas*, Római Kiadó és Nymodaipar: p. 53

[461] Seregi, L. (1988) "Környezetvédlmi Körkép": *Budapest,* 26(10): p. 7

[462] Szabó, Dr. Z.né, (1978) "Általános tájekoztató a Föváros Ipari Szennyvizhelyzetéröl" *Csatornmü Információ*, 1978(2): pp. 21-22

the Hungarian Capital during the 1980s. Some of the most significant decline was in such polluting branches as metallurgy, chemicals and textiles.[463] On the basis of this I would argue that while municipal and industrial treatment contributed, it was the economic crisis, through its effect on Budapest's industries that was the main reason behind the reduced utilisation of the Danube as a pollutant neutralising organic machine.

4.5.2.1 SUBHEADING REGARDING PERCEPTION AS SINK

The perception of the Danube as sink with a great capacity for self-purification was central in the continuous postponement of both the Program and the implementation of industrial pre-treatment. Based on this capacity for self-purification the way the Danube's capacity as sink was presented remained practically unchanged during the 1970s and 1980s. As late as 1985, I. Oszlayi, discussing the Danube's great capacity for self purification states that "(u)nder the current economic situation it would be a sin/mistake not to take advantage of this *equivalent of wastewater treatment.*"[464] Thus the Danube's capacity to function as a sink, as the active component of the organic machine it made Budapest's drainage system into, was still defined as a natural resource, the utilisation of which was rational and advantageous for Budapest.

However, as the Program and the focus on industrial pre-treatment in Budapest had been motivated by, simply relying on self self-purification was no longer seen as enough. As had been argued for extensively in the early 1970s, in terms of many types of pollutants, the loading of the Danube was perceived as approaching the limit of what the river's intrinsic processes could cope with. Thus, even as the development of municipal and industrial wastewater treatment was delayed time and time again during, especially after 1980, it was repeatedly emphasised that the utilisation of the Danube as a sink had to be managed carefully.

Dr. Nemédi et al. emphasised this in 1980 in their article on the subject, "It is an inescapable fact that re-use of water prescribes the protection of the river's self-

[463] Bajnay, L and G. Kopcsayi (1998) "Az Ipar Fejlödése – Ipari Területek, Ipari Üzemek" in: Preisich, G. (ed): *Budapest Városépitésének Története 1945-1990, Tanulmány*, Budapest: Müszaki Könyvkiadó: table: "A termelés alakulása ágazotként", p. 166

[464] Oszlayi, I. (1985): "Duna egy vödör vízben" : *Budapest*, 23(11):Oszlayi, I. (1985): "Duna egy vödör vízben" : *Budapest*, 23(11): p.15 original italics

purification capability and the removal of gross pollution from the recipient."[465] Despite his clear support for, or at the very least understanding of the economic necessity of postponing investments in wastewater treatment, Oszlayi still claimed that "(w)e cannot be allowed to abuse the resilience of the river, as excessive pollution is just what ruins the "investment substituting" self-purification capacity."[466] Oszlayi's statement seemingly indicates that the loading of the Danube's capacity for self-purification could continue at the level it was at around 1985. However his comments regarding the quality of the Danube's waters leaves little doubt about his support for pollution abatement: "Now, after period where it slowed down, the increase of pollution has halted... There would thus be a possibility for the restoration of the stream, we should talk, or rather do much for the improvement rather than the protection of the quality of the water."[467]

Even though the strain on the Danube's capacity for self-purification was decreasing by the end of the socialist era, as the stabilisation and subsequent of water quality during the 1980s is indicative of, the strain was still heavy even after 1989. Due to the shortfall in the implementation of the Program's goals for the development of intercepting sewers, transfers below the river and pump stations for discharge into the main current, the loading of the river with pollutants started already just below Palotai Island, on both banks.[468] Based on long term sampling and observation in 1993 Hegedüs described the Danube water of the upper part of the inner city section as having the "...appearance of an explicitly polluted stream."[469] Open drains and the confluence of the small streams, especially along the Buda bank ensured that the bankside areas where especially intensively polluted, although this was mostly considered to be an aesthetic issue, of no overall consequence to the general quality of the Danube's water in the Budapest area.[470]

Although the inner city section of the river was thus also utilised quite intensively as a sink and self-purification process on a significant level were active

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[465] Nemédi, Dr. et al. (1980) "A Természetes Hígulás Szerepe a Fővárosi Duna-Szakasz Terhelhetösége Szempontjából" *Hidrologiai Közlöny*, 60(3): p. 111

[466] Oszlayi, I. (1985): "Duna egy vödör vízben" : *Budapest*, 23(11): p.15

[467] Oszlayi, I. (1985): "Duna egy vödör vízben" : *Budapest*, 23(11): p.15

[468] Hegedüs, J (1992): "A Duna Víz Mérgezöanyag Tartalma és annak Változása a Föváros Szennyvízei és a Folyam Méregtelenedési Folyamatainak Hatására" *Hidrologiai Közlöny:* 72(1): p.42

[469] Hegedüs, J (1992): "A Duna Víz Mérgezöanyag Tartalma és annak Változása a Föváros Szennyvízei és a Folyam Méregtelenedési Folyamatainak Hatására" *Hidrologiai Közlöny:* 72(1): p.42

[470] Oszlay I. "Duna egy vödör vízben" in *Budapest*, vol. XXIII, no 11, November 1985, Budapest, p.15

also here, it was below the inner city section that the most intensive loading with untreated effluents occurred. Thus, in tune with the long established principles of Budapest's water management, it was in the Csepel section of the Danube that the river's intrinsic qualities were put to the hardest work, as in the past. Commenting on the level of loading in this section in 1992, Wisnovszky and his colleagues at the Budapest Technical University stated that "the self-purification capacity of the river is insufficient along the river section at the Isle of Csepel.[471] If this was so in 1992, it seems clear that it must have been so during the entire period covered by this thesis, as the loading of the Danube with pollutants had declined by then.

The continued utilisation the Danube as a sink was also supported by arguments based on the perception of the Danube as not being so polluted. Other than in terms of bacteriological pollution and as I will discuss shortly, toxicity, the quality of the Danube was seldom classified as more than "slightly polluted", even right downstream of Budapest.[472] As mentioned in chapter 3, the low level of pollution in Hungary was presented as one of the advantages of Hungarian socialism over more developed Western capitalist countries in terms of steering society onto a more environmentally benign path of development.

4.6 The Conflict Between Sink and Source Utilisation Downstream of Budapest

The redefinition of the Danube's capacity as a sink around 1970 had, as discussed in chapter 3, occurred due to the concern over the impact further deterioration of the quality of the Danube's water downstream of the city would have on the planned production of drinking water on Csepel. The main quality parameters of the raw water concerns revolved around were the content of pathogenic bacteria and biological oxygen demand, or rather, the availability of dissolved oxygen. Industrial pollutants were seen as primarily causing aesthetic problems, and the iron- and manganese-ion problems on Csepel were seen as a result of a combination river regulation, dredging and the composition of the aquifers, not the pollutants

[471] Budapest Technical University, Department of Water and Waste-water Engineering, (1993) Wisnovszky, I. (ed) *Integrated Water Resource Management of Budapest and the Surrounding Areas*, Római Kiadó és Nymodaipar: p. 53

[472] Horváth, M (1976) "A Duna Víze Védelmeért" *Vízgazdálkodás és környezetvdelem*, 3(4): p.1 and Seregi, L. (1988) "Környezetvédlmi Körkép": *Budapest,* 26(10): p. 7

discharged at Budapest.

Seen in these terms, as the volume of wastewaters discharged at Budapest as well as the negative effect of the city's seemed to have peaked by the mid 1980s, and drinking water in sufficient quantities and quality had been supplied throughout the period, the dire premonitions from around 1970 had indeed been prevented. In other words, despite the long term overloading of the Danube's capacity for self-purification along Csepel, as defined around 1970, the management of the Danube's sink functions had been successful. At least in terms of preventing the reliance of Budapest on the twin source/sink organic machines through which the Danube had been increasingly integrated into the urban structure from becoming incompatible with one another.

However, the perception of risks the utilisation of the Danube downstream of Budapest as a sink represented for bank-filtered water production evolved during the period from the mid 1970s to the late 1980s. For the most part this concerned how the neutralisation of industrial toxins might possibly affect bank-filtered water quality. Moreover, the emergence of new perspectives on the cause of the dominant concrete water quality problem in Budapest, the above regulation content of iron and manganese-ions many places on Csepel, also increasingly came to be associated with the consequences of self-purification in general; depressed DO values and the organic sludge produced through the decomposition of organic matter.

Concern over the impact of persistent industrial toxins on the quality of the Danube and the drinking water abstracted from the river through bank-filtered wells was evident already in the early 1970s. Despite this, in lieu of any significant progress with the treatment of toxic effluents during the 1970s and 1980s, the disposal of these remained based on what J Hegedüs collectively labelled "natural detoxification" in 1992.[473] As he defines it, "detoxification occurs through dilution, sedimentation, the metabolic action of bacteria and fungi, accumulation in aquatic organisms and the chemical and photochemical reactions occurring in waters."[474] However, as I interpret my sources, in the context of managing the Danube as a sink in a way which avoided acute toxic conditions as far as possible, dilution seems to

[473] Hegedüs, J (1992): "A Duna Víz Mérgezöanyag Tartalma és annak Változása a Föváros Szennyvízei és a Folyam Méregtelenedési Folyamatainak Hatására" *Hidrologiai Közlöny:* 72(1): p.41

[474] Hegedüs, J (1992): "A Duna Víz Mérgezöanyag Tartalma és annak Változása a Föváros Szennyvízei és a Folyam Méregtelenedési Folyamatainak Hatására" *Hidrologiai Közlöny:* 72(1): p.41

have been the only operationalisable factor.

The limit of these qualities of the Danube to ensure detoxification was defined in terms of the detection of acutely toxic conditions at or nearby the site of discharge, the measurement of which was conducted with non-specific tests utilising indicator species.[475] On the basis of analyses in this vein, Dr. Hegedüs et al. made recommendations regarding the level of dilution required by some of the more significant direct discharges of industrial wastewaters in 1978. Sufficient dilution ratios were in general achievable and toxic conditions were rare, although, as they put it, "...varying with the seasons (especially during low water levels) positive (toxic) results were

obtained."[476]

In a later study, from 1980, also co-authored by Dr. Nemédi, they characterise the situation in the following manner: "On the basis of water-toxicology analyses, the average flow of the river currently ensures sufficient dilution."[477] However, based on the fact that toxic conditions did occur at low water levels, as they had in 1978, they go on to state that "it seems that we also in terms of toxic pollutants have reached the limit of load bearing capacity"[478] J. Hegedüs, based on sampling conducted between 1978 and 1989 emphasised that while the Csepel reach was "...heavily loaded with communal and industrial wastewaters...", toxicity levels rarely even reached the medium category, indicating that the level of dilution, while strained, was still sufficient.[479]

While Budapest's water managers were for the most part able to prevent acute toxic conditions from arising by utilising dilution and the other processes of "natural detoxification", and although toxic materials were not detected above regulation limits in the bank-filtered wells on Csepel this practice represented significant

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[475] Hegedüs, J (1992): "A Duna Víz Mérgezöanyag Tartalma és annak Változása a Föváros Szennyvízei és a Folyam Méregtelenedési Folyamatainak Hatására" *Hidrologiai Közlöny:* 72(1): p.41

[476] Nemédi, Dr. L. et al. (1978) "Hígéneńs Víztoxicologiai Vízsgálatok Bevezetése és azok Tapasztalatai a Fövárosi KÖJÁL-ban" *Budapest Közegészségügy:* 10(1): p.14

[477] Nemédi, Dr. et al. (1980) "A Természetes Hígulás Szerepe a Fövárosi Duna-Szakasz Terhelhetösége Szempontjából" *Hidrologiai Közlöny*, 60(3): pp. 111-112

[478] Nemédi, Dr. et al. (1980) "A Természetes Hígulás Szerepe a Fövárosi Duna-Szakasz Terhelhetösége Szempontjából" *Hidrologiai Közlöny*, 60(3): p. 112

[479] Hegedüs, J (1992): "A Duna Víz Mérgezöanyag Tartalma és annak Változása a Föváros Szennyvízei és a Folyam Méregtelenedési Folyamatainak Hatására" *Hidrologiai Közlöny:* 72(1): p.41

potential risks. The sedimentation of dissolved and suspended toxic materials, which as Hegedüs defines it was part of the process of "natural detoxification" entailed that the river bottom downstream of Budapest in practice became an ad-hoc dumping ground for hazardous wastes. In a mid 1980s survey of heavy metal concentrations in the bottom sludge of the Danube, the highest values for Zink, Cadmium, Lead, Chromium and Copper were found at Budapest.[480]

Through sedimentation, the utilisation of the Danube as a sink for industrial toxins and for the suspended organic matter abundant in the form of faecal matter in household wastewaters was interrelated.When deposited, heavy metals and other persistent pollutants were attached to or mixed with organic sludge or other sediments. This sludge and its deposition on the bed downstream of Budapest was according to an article by Dr. Nemédi et al. from 1991 by then seen as being more directly responsible for the pervasive quality problems related to iron and manganese-ions than it had in the past.[481]

In a similar way as how sedimentation was seen as a part of the process of "natural detoxification", sedimentation was also one of the primary means through which the self-purifying tendency of rivers was perceived as acting on the organic load of the stream.[482] Moreover, one of the circumstances under the deposited heavy metals could be reactivated, which was the precondition for them to constitute a risk, was the same anaerobic conditions created by the clogging of the bed with sludge which caused leaching of iron and manganese.

Thus, according to the knowledge available around 1989 the potential toxic risks and the concrete iron-manganese problems the bank-filtered wells were exposed to were both a direct result of the utilisation of the Danube to treat Budapest's wastewaters. This was not limited to conditions where the Danube's perceived capacity as a sink, whether in terms of BOD, DO, acute toxicity or aesthetic criteria, but rather due to the side effects of how they functioned. Thus, as practised until the end of the socialist era and beyond, Budapest's utilisation of the Danube's intrinsic processes as part of the organic machine these made the drainage system of the

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480 Benedek, P (1986): "A Duna Vízminöségéröl", *Hidrologiai Közlöny:* 66(4-5): p.199

481 Némedi, Dr. L. et al. (1991) "A Partiszürésü Kutak Vízminösége Budapest Térségében a Tervezet Nagymarosi Erömü Épitése Elötti Években (1986-1990)", in: *Budapest Közegészségügy*, 23(2): p.38-39

482 Keeling A. M. (2007) "Charting Marine Pollution Science: Oceanography on Canada's Pacific coast, 1938-1970" J*ournal of Historical Geography:* 33(2): pp. 420-425

Hungarian capital into was in fact incompatible with bank-filtered drinking water production on Csepel; In contradiction of, if not what was what perceived, then at least what was stated publicly, the "investment substituting" utilisation of self-purification was what at least in part caused the drinking-water quality problems which in turn made investments in ozone treatment necessary.

4.7 Chapter summary

During the 1970s and 1980s, the Kádár regime and local decision makers in Budapest failed to implement the measures planned to prevent the feared conflict between organic machines on which Budapest's water management was based. Despite this, Budapest's situation in terms of water resource endowments, based on the utilisation of the Danube's intrinsic processes both for drinking-water production and wastewater disposal, continued to be seen as and also was advantageous. Moreover, by the 1980s the surface water quality of the Danube at and below Budapest had stabilised, and was improving by the end of the socialist period. Despite this, due to new perceptions of what types of pollutants constituted risks and how, as well as new knowledge about how the old problem of iron- manganese-ion pollution, the potential for conflict between these uses of the Danube were far from resolved.

The failure to follow the planned pace in phasing out the the reliance on the Danube for neutralising the pollutants were one of the wide ranging and interconnected consequences of the economic crisis Hungary entered during the course of the 1970s and 1980s. As a result of the declining availability of funds, urban development in Budapest continued to be characterised by a significant implementation deficit in relation to projects not considered essential by the regime or by Budapest's powerful industrial actors. The level of ambition of planners and central decision-makers in relation to Budapest's development declined from ÁRT to ÁRT in the 1970s and 1980s. Despite this, especially in housing development, significant advances were made in the modernisation of the Hungarian capital.

The plans for greening Hungarian socialism, or perhaps rather, realising what was perceived as the inherent advantages advantages of socialism, were affected in a similar way. The level of ambition declined steadily during the course of the 1970s and 1980s: from halting environmental deterioration and starting the imminent improvement of environmental quality in the mid 1970s, to being limited to preventing further deterioration in some places by the late 1980s. At a general level, investments in environmental infrastructures declined steadily. Moreover, the regulative and institutional regime which was intended to bring industrial enterprises into compliance

with the relevant environmental legislation also failed to function as intended.

These implementation gaps in urban and environmental development in Hungary, as well as how the economic crisis affect which policies, projects, and measures were and were not implemented affected the issues in focus in this thesis in concrete ways. The peaking of of the intensity at which the organic machines on which Budapest's water supply and wastewater disposal depended were to a large extent a result of the way Budapest and its industries developed in the 1970s and 1980s. The implementation gap in the development of municipal and also industrial wastewater treatment was also interrelated with the overarching implementation gaps in urban and environmental development.

Despite lower than planned funding, FVM managed to stay ahead of demand also in the 1970s and 1980s. This came at the expense of network expansion, and the goal of achieving full water supply coverage in Budapest was not achieved. In terms of drinking water quality, there were, as expected, significant problems with many of the new wells which were sunk during the 1970s and 1980s at Csepel. These problems were primarily, but not exclusively in the form of the old problem of above regulation levels of iron- and manganese-ions in the abstracted water. Without the construction of drinking-water treatment works at Csepel, these quality problems would have led to renewed water shortages in Budapest.

Both the Program, the tightly scheduled and ambitious plan for treating all the wastewaters drained through Budapest's public sewers by 2000, and the implementation of industrial wastewater treatment which was to accompany it, failed to meet the planned targets. By the time investments were halted due to the austerity measures implemented in the mid 1980s, 6 years in, the Program was 10 years behind schedule, in terms of treatment capacity as well as the supporting infrastructures. After some initial success in forcing industrial actors to treat through fines and inspections during the 1970s, there was no more progress during the 1980s. As I have argued, this was both directly and indirectly a result of the shortage of investment funds.

However, that the economic problems affected the pace of the planned replacement of the reliance on Danube's intrinsic, self-purifying process for pollutant neutralisation with technical solutions was affected thus by the economic problems of Hungary was a choice. A choice, taking the centralised decision making structure of both urban development and environmental protection into account, made by central decision-makers. While this was so, I would argue that it is clear that the work of Hungarian water managers, water quality and public health experts in defining the Danube as a sink, how bank-filtering functioned as well as the relationship between these two organic machines, was central in informing these decisions.

The repeated deferment of investments in wastewater treatment, both in relation to the Program and industrial pollution abatement, was a result of the fact that it during the 1970s came to no longer be seen as a pressing issue. The capacity of the Danube as a sink continued to be defined as sufficient, although by the time pollution peaked around 1980 approaching the limit in terms of loading with some pollutants. Moreover, the utilisation of this capacity of the river continued to be seen as, if not desirable, then at least rational, especially in light of Hungary's economic difficulties.

As I see it, an especially central premiss of this postponability of phasing out the utilisation of the Danube as a sink was the until the end of the socialist era dominant explanation of the iron-manganese problems on Csepel as unrelated to the wastewater discharges at Budapest. Thus, as surface water quality downstream stabilised around 1980, and no other significant quality problems attributable to the quality of the raw water were present in the waters abstracted from the wells on Csepel, there was no pressing reason for advancing treatment.

Although the phasing out of the utilisation of the Danube as a sink had been meant to fulfil wider goals, the restoration of degraded recreational functions, and the improvement of surface water quality as part of the general effort to improve the quality of life, were even more easily abandoned. While this was so, after the fall of socialism, new, later confirmed perspectives on this issue emerged which indicated that the reverse was true. Moreover, concern was also growing over the implications of the continued utilisation of the Danube for neutralising industrial toxins.

5 Chapter 5: Conclusion

My overall objective in this thesis is to explore how Budapest' dual dependence on the Danube affected and was affected by the development and growth of Budapest during the socialist era. In the following I will attempt to answer this by addressing the four sub-questions I divided this overall question into: 1) to what extent the socialist context and form of Budapest's development was responsible for the significant changes in how the source and sink functions of the Danube were utilised; 2) how the socialist regime attempted to manage and prevent the potential for conflict which by 1970 was seen as exiting between these uses of the Danube, and how this relates to the then ongoing process of de-coupling urban and industrial development from aquatic pollution in the developed world; 3) how the socio-political context of Hungarian socialism and the physical and socially constructed characteristics of the

resources utilised affected this attempt at environmental management; 4) and finally how all this affected the socialist development of Budapest

In this analysis I will utilise perspectives drawn from the urban environmental history canon, as well as the urban sociology discourse on socialist cities. By explicitly looking at the empirical material presented in my three core chapters through these lenses, I wish to emphasise how the changes and continuities in Budapest's utilisation of the Danube as a source and sink was both similar to and different from how such relations developed between other cities and other bodies of water. Moreover, that while some of these differences were a result of the socialist socio-economic context of urban development and environmental protection in Hungary during the period in question, the specific local conditions of the Danube at Budapest also had decisive influences.

5.1 Question 1

Urban environmental historians, Melosi among them, have emphasised how the growth of cities, as well as the general and site specific characteristics such growth has taken, has influenced the relationship between urban areas and their aquatic environment.[483] It is with this in mind I have attempted to uncover how the socialist context affected urban form in Budapest. As I discussed in my introduction, and as I have also touched upon during the course of my empirical chapters, this has been an issue of contention. While this dispute is primarily of significance for urban sociologists, it does have a purchase on several of the questions I have sought to answer in this thesis. The most clear relevance is for the question in focus here. As I see it, if the the socialist context indeed made Budapest into a different city, it is possible that some of these differences were relevant for how the relationship between Budapest and the Danube's function as a source and sink, as well as the relationship between these uses developed.

In reference to Enyédi and Szlenényi's conflicting views on this issue, I would argue that they are both to some extent right in their evaluation of Budapest's development. Both in terms of its similarities to Western cities and its differences. I

[483] Melosi, M. V. (2001) *Effluent America: Cities, Industry, Energy, and the Environment:* Pittsbutgh, Pa.: the Pittsburgh University Press: pp. 12-14 and 148

would argue that socialism in Hungary was modern, but a distinctive kind of modern. This resulted in urban structures, urban forms and urban problems which although to a large extent similar to those of other modern cities, nonetheless developed in a different context and thus were to some extent different. In the following I will argue that this was also the case in terms of how Budapest's development affected the source and sink functions of the Danube on which the city depended.

The origin of the specific need to alter the advantageous water-management regime inherited from the pre-socialist era was growing water consumption. This was perceived as making the development of the Csepel aquifers necessary, the protection of which in turn was perceived as making wastewater treatment necessary. Growing water consumption, both in the industrial and household sectors, as well as the increasingly industrial character can rightfully be ascribed to concrete socialist policies and plans. Thus, one might be tempted to blame the inherently risky choice of utilising the Danube as a both a source and sink in a direct way along Csepel on the socialist regime.

However, as I have argued in chapter 3, the expansion of water production to Csepel was a necessity. The Csepel aquifers represented the by far most practical alternative for ensuring Budapest's supply in the future. In addition to this local factor, the choice of utilising the Csepel section of the Danube as both source and sink was to a large extent due to shared modern social and material circumstances. On the one hand, the dominant scientific and engineering perspectives and practices in water management. Including the definition and quantification of the Danube as a sink, as well as the definition and understanding of what pollutants constituted risks.

On the other, the growth of cities and the consequences this had in terms of the intensity with which water resources were consumed. Urban growth was not a socialist phenomenon. Neither was the concentration of industrial production around urban areas, their source of labour, nor growing per-capita water consumption as a result of the modernisation of the housing stock. Moreover, as Melosi has discussed in a US context, use conflicts between the source and sink functions of bodies of water due to spatial changes in their relative distance, as happened at Csepel, were not uncommon. While this was due to urban sprawl in the US, the effect was the same.[484]

As Hungary's pre war capital, the heart of the Hungarian economy, the

[484] Melosi, M. V. (2008) The Sanitary City : *Environmental Services in Urban America from Colonial Times to the Present*: Pittsburgh, Pa. : the University of Pittsburgh Press: pp. 310-311

country's cultural centre and its most significant communication hub, I would argue that continued urban and industrial growth, and consequently intensified use of the Danube as a source and sink, would have occurred independently of what political regime was in control. While this is so, many of the specific characteristics of urban growth in Budapest, its timing and its pace were to a large extent a result of socialist policies.

Most significantly in terms of water management, this includes the choice of when to integrate the Csepel aquifers into the water supply system, and the policies which made this necessary. The generally rapid growth of water consumption until 1970, as well as the expected continuation of significant growth in the demand were both results of concrete socialist policies in Budapest. However, I would argue that this was not enough to force the decision of expanding water production to Csepel.

The still undeveloped stretches of aquifers on Szentendre Island, at least in theory, made this postponable, for example, until a point in time when Budapest did not rely so heavily on the Danube for pollutant neutralisation. Thus, I would argue, it was the insistence on the need to develop the southern periphery which made it seem necessary to start developing the Csepel wells at the exact point in time. The fact that this was seen as practicable, despite the risks it was argued to entail, was due to the fact that it was believed that there would be money to spare for beginning the phase-out of Budapest's reliance on the Danube for pollutant neutralisation in the 1970s.

5.2 Question 2

As I argued in chapter 3, defining the integration of the Csepel aquifers into the water supply system of Budapest as contingent upon the implementation of the Program and the increased focus on industrial wastewater treatment which was to accompany it was based on uncertainty. The production of water for human consumption through bank-filtering from as pollutant laden water as what flowed through the bed of the Danube at Csepel had not been attempted in Hungary. It was thus not known what effect the continued growth of wastewater discharges from Budapest would have on the quality of the water abstracted from the wells being established along the western bank of Csepel.

Looking back, it seems logical and proper that this problem should be resolved

through wastewater treatment, as we have come to see the discharge of untreated wastewaters into living waters as wrong and destructive. Especially on the scale it was practised on in Budapest around 1970. That we perceive this as such, however, the intrinsic value we ascribe to clean streams, lakes and oceans, is the result of one of the most significant changes in the relationship between human societies and their aquatic environments.

Until well into the postwar era, the utilisation of aquatic media as sinks was seen as rational and necessary. Treatment was only seen as necessary to avoid overloading the perceived and quantified capacity of bodies of water to act as sinks, and as Bendickson has emphasised, "...the convenient temptation to overtax natural capacity was generally irresistible."[485] Moreover, according to Tarr, the usual practice was for the cost of the pollution problem to be borne by downstream users, through drinking water treatment, rather than upstream users, through wastewater treatment.[486]

The idea that wastewaters should be treated, regardless of the perceived capacity of the recipient as a sink, was relatively new around 1970. This was a part, also in Hungary, of the generally increasing concern over the negative impact of human societies on their environment, and the risks this entailed, primarily for human health. However, more symbolic and ethical dimensions were by the 1970s gaining prominence in Western countries as a result of the emergence of the environmental movement.[487]

The potential conflict between the utilisation of the Csepel section of the Danube as both sink and source is an interesting issue, as Budapest in this case was both the upstream and downstream user. Thus, unlike what the issue would have been otherwise, whether the issue was resolved through drinking-water or wastewater treatment, it would entail a significant change in Budapest's water management. Either way, one of the organic machines on which the advantageous water management regime established in Budapest in the pre-socialist era relied would have

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485 Bendickson, J. (2007) *The Culture of Flushing: a social and legal history of sewerage*, Vancouver: UBC Press: p.327

486 Tarr, J. A. (1996) *The search for the ultimate sink : urban pollution in historical perspective*, Akron, Ohio: University of Akron Press: p.13

487 Keeling, A. M. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" *Urban History Review/Revue d'histoire urbaine* 34(1): p. 65 and

Melosi, M. V. (2008) The Sanitary City : *Environmental Services in Urban America from Colonial Times to the Present*: Pittsburgh, Pa. : the University of Pittsburgh Press: p. 291

to be altered in a way which would significantly increase costs. The low cost of both drinking-water production and wastewater disposal, as I have argued in chapter 2, being one of the main advantages of Budapest situation on the Danube.

As I have argued in chapter 3, the Danube's capacity as a sink, when seen in isolation from other uses, was still perceived as copious enough to accommodate the projected increases in wastewater discharges for the next 15 years in 1970. Thus, I would argue, the choice made by central decision makers in 1974 to go for full scale wastewater treatment as a solution to the potential use conflict between the organic machines at Csepel was far from obvious. It seems clear to me that treating all of the city's wastewaters, albeit in the long run, must have been a more expensive solution than treating the in any future scenario much smaller volume of water abstracted from the wells to be sunk on Csepel.

However, as Tarr has pointed out in relation to the US in his *The Search for the Ultimate Sink*, the resolution of similar use conflicts in the past through drinking water treatment, as had been the established practice in most countries, "...did not improve water quality in terms of other potential waterway uses."[488] As I have argued in chapter 3, preventing further deterioration of the quality of surface water in the Csepel section of the Danube was only one of the aims of the plans laid in the early 1970s. The Program and its attendant focus on industrial pollution abatement also aimed at preserving and restoring degraded recreational functions along the Danube in Budapest, as well as improving surface water quality as a part of an overall effort to improve environmental quality in general. Thus, stabilising and in the long term improving surface water quality of the Danube in Budapest, was chosen as the solution which would address the broadest range of issues.

That central decision-makers, as well as the water management experts advising them opted for this solution reflects a connection with the wider process of the emergence of environmental concerns, both in Hungary and internationally. As I discussed in chapter 3, treatment on a more limited scale had both been proposed and implemented in the past. These had, however, been aimed at the management of localised negative effects of utilising the Danube as a sink.

However, phasing out the utilisation of the organic machine the capacity of the

[488] Tarr, J. A. (1996) *The search for the ultimate sink : urban pollution in historical perspective*, Akron, Ohio: University of Akron Press: p.13

Danube for self-purification functioned as entirely, was a new development. Popular pressure for higher quality river water, such as there was places in the West and was an important factor in the broadening the issue to include less economic and helath related concerns, was not a factor in Hungary in the 1970s. However, as a part of the Kádár regime's general project of improving the standard of living in Hungary, the effort to prove that the regime worked "for the people" supplied its own pressure also in relation to environmental protection. That this broader and arguably more costly solution to the potential use conflict in the Csepel section was chosen is more understandable in this context.

As Keeling and Melosi have argued for the initial wave of concern over aquatic pollution in North America in the 1960s, preventing risks, resolving use conflicts and managing resources remained the primary motivation behind pollution abatement also in relation to Budapest.[489] Moreover, as Keeling has showed in his Vancouver case, the range of relevant uses with which the use of the river as a sink could conflict were broadened also in Budapest.[490] The continued and intensified focus on preserving and also in the long run restoring the recreational functions of the Danube, I would argue, was a direct result of the regime's focus on improving the standard of living, and from the 1970s also the quality of life.

In light of the continued perception and utilisation of the Danube as a sink, I would argue that the focus on full treatment was to a large extent symbolical and ideological motivated. This went further than showcasing the concern of the Kádár regime for the environmental quality of life in Hungary. As I have argued in chapter 3 and 4, the socialist environmental protection, management and development regime, the implementation of which began in Hungary in the 1970s, also aimed to show that socialism was better suited to protect the environment than capitalism. Thus, as focus on aquatic pollution and pollution abatement grew in the West, making impressive advances in this field was seen as symbolically and ideologically significant.

Thus, even though the solution chosen was arguably not the most cost

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[489] Keeling, A. M. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" *Urban History Review/Revue d'histoire urbaine* 34(1): p. 65 and
Melosi, M. V. (2008) The Sanitary City : *Environmental Services in Urban America from Colonial Times to the Present*: Pittsburgh, Pa. : the University of Pittsburgh Press: p. 291

[490] Keeling, A. M. (2005) "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River" *Urban History Review/Revue d'histoire urbaine* 34(1): p. 65

effective, and that full treatment was not even perceived as a necessity for averting conflict between the organic machines in the Csepel section, as I have argued in chapter 3, this solution made sense in the bigger picture. Moreover, taking the bright economic prospects of the period around 1970 into account, plans which went beyond the necessary and practical were, I would argue, seen as realistic to implement. However, I would argue that these broadened aims remained ad-ons. The main objective of water-management in Budapest remained resource management and averting the potential conflict between the organic machines in the Csepel section.

5.3 Question 3

Despite both the perceived practical necessity and constructed symbolic significance of implementing the Program and its attendant regulation of industrial wastewater discharges, as I have elaborated on in chapter 4, this was not accomplished as planned. At a general level, the primary reason for this was the failure of the Kádár regime to deal with the economic difficulties of the 1970s and 1980s. Moreover, that the attempts made at economic recovery caused a prevailing and escalating shortage of investment capital. Thus as implementation of the ambitious plans for both urban development in Budapest and environmental protection in general progressed, prioritisations and cuts had to be made.

As I have elaborated on in chapter 4, the reasons for the lack of success with the planned phase out of the use of the Danube as a sink at Budapest was primarily due to two reasons. On the one hand, how the functioning, or rather, dysfunctions of the reformed socialist economic system led to decreased funding for the Program as well to the lacking success of the attempted regulation of industrial discharges. On the other, that despite the fact that the viability of drinking water production through bank-filtering on western Csepel was declared as dependent on halting the decline of surface water quality in the Csepel section of the Danube, wastewater treatment in practice remained seen as postponable.

The first of these reasons, how the dysfunctions of the socialist economy caused non-industrial investments to be cut, has been analysed sufficiently in chapter 4. However, while this caused the Kádár regime to take advantage of the perceived opportunity for postponement, as I see it, the postponability of wastewater treatment

itself bears closer analytical scrutiny. As I mentioned in chapter 4, this tendency of postponing aquatic pollution abatement has been described by urban environmental historians also in relation to the west. Although Tarr in his work describes much older cases from the US, Melosi and Hassan have discussed cases which are coterminous with the subject of this thesis.[491]

In my case, the perception of wastewater treatment as postponable was based on the Danube's physical and socially constructed properties, both as a sink and a source. That is, the perception of the organic machines of self-purification and bank-filtering as able to deal with the work load delegated to them through Budapest's until 1980 mounting pollutant discharges. Although this perception of the organic machines on which Budapest continued to rely was to some extent, I would argue, based on habit, that they had always worked, it also had a strong basis in how bank-filtering was perceived to work by the water quality experts advising the regime.

Most significantly, this revolved around the fact that the quality problems experienced with the water abstracted from the wells established on Csepel remained, at least by the responsible decision-makers, seen as unassociated with the utilisation of the Danube as a sink. The most significant example of this is that the mounting iron- manganese-ion problems on Csepel and the sludge deposition causing it seemingly continued to be perceived as unassociated with the high organic load discharged at Budapest. As this was the only significant concrete pollution problem, the risk of low level pollutants being seen as that, a risk, the dire predictions which motivated the initiating the phase-out of the use of the Danube to neutralise urban and industrial pollutants were seen as not having come to pass.

In addition to this, as I have discussed in chapter 4, the capacity of the Danube as a sink, its "investment substituting capacity for self-purification, remained seen as sufficient.[492] Moreover, the Danube also continued as comparatively clean, the basis of comparison here being the intense pollution of Western rivers in the past, was also

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[491] Hassan, J. (1998) *A History of water in modern England and Wales*, Manchester : Manchester University Press, p. 127, 138, 149

Tarr, J. A. (1996) *The search for the ultimate sink : urban pollution in historical perspective*, Akron, Ohio: University of Akron Press: p.13

Melosi, M. V. (2008) The Sanitary City : *Environmental Services in Urban America from Colonial Times to the Present*: Pittsburgh, Pa. : the University of Pittsburgh Press: p. 389

[492] Oszlayi, I. (1985): "Duna egy vödör vízben" : *Budapest*, 23(11): p. 15

stated many times.[493] Together with the lack of drinking-water quality problems attributed to the utilisation of the Danube as a sink, these remained powerful arguments for deferring investments in treatment. Thus, despite the adoption of some of the new perspectives regarding undermining the utilisation of aquatic media as sinks emerging in the 1970s and 1980s, such as the focus on the effects of industrial pollutants, status quo remained.

In their work, both Tarr and Bendickson have emphasised the persistence of the perception of utilising aquatic media, rivers among them, for neutralising and removing pollutants as "natural" and rational. To a large extent this remained based simply on arguments that this worked. As they have also emphasised, this was supplemented by economic arguments, which emphasised the advantage of not treating and the disadvantage of doing so.[494] Although in the west, at least in the industrial sector, as the economic mechanisms differed from those in Hungary in significant ways, the economic logic behind such arguments, the importance of profitability and competitiveness, were very different from what was the case in Hungary. Cuts in public spending on wastewater treatment in the 1970s, as Melosi has described it in the US and as Hassan has for the UK, was on the other hand similar in many respects. It was to a large extent caused by the negative economic consequences of the energy crisis and the pursuit of restrictive government spending policies to counter these.[495]

In Hungary, as Enyédi and Zentai have emphasised, it was rather the shortage of investment funds which was the main rationale and argument for postponing treatment. In this context, where a general implementation deficit prevailed, as wastewater treatment was no longer seen as a pressing issue, the decision to postpone made economic sense. This is clearly evident in the council sector of the economy, where the failure to keep the schedule of the Program was a clear consequence of the

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[493] Nemédi, Dr. L. and G. Pietrasko (1983): "A Budapesti Duna-Szakasz Mikrobiologiai Állapota" *Vízügyi Közlemények:* 65(2): p. 267

[494] Bendickson, J. (2007) *The Culture of Flushing: a social and legal history of sewerage*, Vancouver: UBC Press: pp.327-328

arr, J. A. (1996) *The search for the ultimate sink : urban pollution in historical perspective*, Akron, Ohio: University of Akron Press: p.29

[495] Melosi, M. V. (2008) The Sanitary City : *Environmental Services in Urban America from Colonial Times to the Present*: Pittsburgh, Pa. : the University of Pittsburgh Press: p. 389

Hassan, J. (1998) *A History of water in modern England and Wales*, Manchester : Manchester University Press, p. 127, 138, 149

declining spending on urban and environmental infrastructures. Thus, as a result of the overall over-ambitious plans, there were constantly more projects planned than what there were funds for, those which could be postponed were postponed.

The failure of the regulative regime to result in more significant advances in terms of industrial wastewater treatment must to a large extent be seen as a result of the leniency of the Kádár regime towards industrial polluters in Budapest. This, as I have discussed in chapter 4, was to some extent a result of the complex dynamics of de-facto state ownership and the in practice quite independent behaviour of industrial actors, primarily the soft budget constraints. However, postponability is also relevant in this context, as a factor giving room for leniency. As industrial pollutants were not seen as affecting the bank-filtering process to any significant extent, the scarcity of investment funds must have been an effective argument against prioritising their elimination from the wastewater stream.

The above should in no way be seen as an apologism for the socialist regime's failure to follow its plans regarding wastewater treatment in Budapest. It is clear that the failure to achieve the intended results was a result of clear choices made by the decision-makers of the Kádár regime. My intention is rather to show that seeing wastewater treatment as postponable was not limited to socialism. It was based on the shared perception in all developed countries of bodies of water as sinks. Although this was in the process of changing in the 1970s and 1980s, giving way to a more unforgiving view of aquatic pollution, it still influenced decision makers in significant ways, and not only in socialist countries.

5.4 Question 4

The advantageous pre-socialist water management regime of Budapest, despite the significant changes made to it, the intrinsic processes of the Danube continued to be the basis of water supply and wastewater disposal also during the socialist era. Even though the planned technical changes intended to offset the risk the changes in the spatial organisation of sink and source functions utilised were perceived as entailing were not implemented fully, the organic machine of bank-filtering continued to provide sufficient water. Moreover, taking Budapest size as a city, and the massive volume of untreated wastewaters discharged into account, it is clear that the Danube's

great volume ensured that the degradation of the aquatic environment remained comparatively mild.

Even the quality problems experienced in relation to the Csepel aquifers did not entail that restrictions were placed on the development of Budapest due to the quantity of potable water available. While this was so, this was dependent on the investments made in drinking-water treatment installations on Csepel. As I have argued in chapter 4, the iron- manganese-ion problems which these installations were built to address, were in fact to a large extent a result of the utilisation of the Danube as a sink for Budapest.

Thus, although perhaps not to the extent feared around 1970, the two organic machines which operated in the Csepel section of the Danube were incompatible, and this did lead to a rise in the cost in water production. Moreover, in attempting, but failing to manage this problem through the broader and more ambitious means of wastewater treatment, both this and drinking-water treatment strained the already overloaded urban development budgets for Budapest. Thus, I would argue, although the lack of drinking water or its low quality did not hinder urban development in Budapest directly, indirectly it exacerbated the general implementation deficit in relation to the socialist plans for the development of Budapest.

Although the the negative surface water quality impact of Budapest's utilisation of the Danube as a sink was decreasing by 1989, this was as argued in chapter 4 not a result of the policies pursued by the Kádár regime. Rather, it was primarily an unintended by-product of the undesired decline of industrial production in Budapest. Moreover, although further intensification of pollution was thus unlikely, the deposited results of utilising the Danube for “natural detoxification”, various persistent industrial toxins, would continue to represent a risk for water production on Csepel for a long time. As for bringing Budapest up to speed in terms of wastewater treatment, the socialist era left much undone. In fact, to a large extent as a result of Hungary's continued economic problems after 1989, the development of municipal wastewater treatment was not yet completed in 2008.

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