

ABSTRACT OF THE PhD THESIS

**LANDSCAPE PLANNING TASKS RELATED TO MUNICIPAL SOLID WASTE
DISPOSAL**

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1. INTRODUCTION

In the last years the growing amount of municipal solid wastes caused more and more serious problems in Hungary. The habits of the Hungarians changed to a great extent approaching to the Western-European consumer costumes. More and more disposable goods are used in the households.

The disposal of communal wastes is solved mostly by the settlements by inefficient environmental technologies in spite of the growing number of regional landfills.

Because of the practice of local dumping most of the landfills operate on geological inappropriate place using unprofessional technologies. Waste disposal in the surroundings of the settlement causes ecological, economic, hygienic and landscape aesthetic conflicts (landfills occur as devastated areas). It is practical that the landscape conditions should be taken into account separately as well, but the lack of the holistic approach leads to landscape conflicts. As numerous examples show the illegal and inappropriately disposed wastes are dangerous to the environment.

During industrial activities growing amounts and types of wastes are arising. The amount of wastes produced each year in Hungary is significant, even compared to the more developed EU countries. The wastes get into *controlled or rather uncontrolled* landfills but just a fraction of it is incinerated or recycled.

The inappropriate technological solutions, the uncontrolled waste disposal are harmful to the environment, but under suitable conditions waste deposition can change the environment in a favourable direction.

Landfills may solve landscape conflicts creating new green spaces or building sites in cities. A very good example can be the landfill functioning in Csillaghegy (Budapest). Here the quarry, the destroyed hillside is filled up with inorganic materials. In the end of 1800's the wetlands along the Danube were filled up with waste and the Technical University was built on these areas. The vestiges of waste deposition can not? be seen anymore.

Waste management is a wide-ranging field of environmental protection. In this field the tasks of municipal solid waste disposal stand the closest to a landscape architect. My research work is dealing with the landscape effects of waste. I studied the situation of the municipal solid waste disposal, the actions aiming at decreasing the quantity of waste and the landscaping tasks related to waste disposal in Hungary.

Goals:

1. Survey of the situation of waste management in Hungary

In Hungary about 72,5 million tons of waste was generated in 1999. 3,7 million tons of this amount are hazardous, approximately 65,8 million tons are not hazardous waste and almost 3 million tons are the so called *inert* waste. More than half of the not hazardous waste is mostly organic waste generated in the agriculture. The two third of the approximately 4,5 million tons municipal solid waste is generated in households, the rest in institutions and services. Municipal liquid waste is about 6,3 million t/year generated in settlements without drainage system and sewage water treatment plant, the quantity of sewage mud from treatment plants is about 0,5 million tons. The rest 23,2 million tons of not hazardous waste is of industrial origin (National Waste-management Plan, 2001.).

2. Analysis of the legal institutional system of waste disposal

A few years ago still each settlement solved its waste disposal problems by itself so there was landfill in each settlement. Parallel to the EU integration the approach changed and in place of local landfills the regional landfills were pushed forward. According to the current legal rules and the National Waste-management Plan just regional landfills can be established. During my researches I analysed the advantages and disadvantages of the local and regional waste dumping sites.

3. Survey of the after-life of closed landfills

The biggest amount of waste is produced in Budapest, the largest city of Hungary. According to my researches here begun the organised waste collection at the first time in the country and the most landfills out of use can be found here. In my opinion the capitol was the right area for research of after-life of landfills. The Public Spaces Maintenance Company of the Capitol has operated several landfills in the area of Budapest in the last decades, that were established in former quarries. After the three cities were united (Buda, Óbuda, Pest) and Budapest came into existence the urban development accelerated and in the surrounding of urban areas several clay- and stone-pits were operated. After closing the mines people used them for deposition of waste anyway. There was also the possibility for the Public Spaces Maintenance Company of the Capitol to find appropriate still not recultivated pits. During the operation of the mines there were just uninhabited nearby. In the last decades the city sprawled around these areas as well. The public opposition and the decrease of storing capacity inspired the Public Spaces

Maintenance Company to finish deposition and to return the areas to the self-governments.

4. Summary of environmental, social and economic effects of waste disposal, and elaboration of action programs to decrease the quantity of wastes

All actions affecting the human and its environment should be inspired by the concept of sustainability. Sustainable development has been interpreted in different ways. According to the original Brundtland definition: „Sustainable development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Nowadays sustainable development of economy is meant to be the production limited by renewal capacity of natural resources, the requirements of human health and environmental loadability meanwhile it creates the involvement of the economic participants to meet the needs of society and environment. The environmental, social and economic effects of the actions are connected but they never can be equal.

5. Environmental analysis of siting methods of landfills

Unfortunately waste disposal is still considered as economic problem so mostly economic aspects are taken into consideration without landscape and environmental aspects at siting of waste dumping sites. I analysed the internationally widespread siting methods and enriched them by landscape and environmental aspects.

2. METHOD AND STUDY MATERIALS

1. Statistical data processing

Analysing the waste management situation in Hungary I used statistical data which presents the spatial distribution of waste generation. This helped to elaborate action programs to decrease the quantity of waste since the selection of technology is influenced by waste generation customs.

2. Data sheet survey

I elaborated special data sheets for the survey of old landfills. By completing the data sheets I gained overview about the after-life of landfills, method and effectivity of recultivation.

3. Elaboration of a method for siting of landfills

I elaborated special data sheets for siting of landfills. By completing the appropriate data sheets the process of siting became considerable easier and faster.

4. GIS

Both analysing the waste management situation and surveying the old landfills I used GIS software which made possible the elaboration of national data banks. I applied GIS program also working out the recultivation plan on the model area.

3. SCIENTIFIC ACHIEVEMENTS, AND THE POSSIBILITIES OF PRACTICAL UTILISATION OF THE THESIS

In the last years the disposal of municipal solid wastes caused always more serious problems in Hungary as well in all developed countries. The elaboration of modern waste management strategies could solve this problem. Landscape architects should have a great roll in minimising the environmental load of waste disposal.

In the study I summarised waste management and landscaping tasks related to municipal solid waste disposal. I studied

- the methods for minimising the quantity of generated and dumped waste,
- the selection possibilities of the optimal siting of landfills,
- the solving of environmental problems generated during the operation of landfills.

I studied the foreign scientific literature related to this field, on my study trips I looked into the German, Austrian, Italian waste management practice.

Scientific achievements:

1. On the basis of my research I pointed out that in the recent years and decades the quantity of municipal solid waste has gradually grown in Hungary as well. Especially the quantity of reusable materials has grown significantly. Because of the growing quantities of packaging materials or rather the solid burning is pushed into the background the volume mass of solid waste is decreasing meanwhile its volume is growing. In case of right waste collection significant part of municipal solid waste would be recyclable (fast 18,5% paper, 4,5% plastic, 3% textile, 5-6% glass, 4,5% metal), so the quantity of dumped waste could be decreased.
2. Analysing the waste management situation I pointed out that about 700 landfills operate in Hungary. Realising the National Waste-management Plan this number will decrease to 100–120. Because of the public opposition it is not easy to select the location of the regional landfills. The NIMBY syndrome (Not in my Backyard) is in Hungary also widespread. Nobody want to accept the waste, everybody want to get rid

of it. The public opposition for the experiences of the last decades is understandable. Damages caused by partly controlled and uncontrolled anyway inappropriately dumped wastes are frequently reported. These experiences taught the people that the answer to landfills is no. Just persistent convincing could change this negative attitude. By appropriate compensation the possible negative effects of landfills could be acceptable for the population.

3. Analysing the foreign and national legal rules I revealed the shortcomings of the Hungarian legal rules and gave recommendations for developing the legal institutional system and taking into consideration environmental aspects during location of landfills.
4. On the basis of my research I pointed out that both local and regional landfills have advantages and disadvantages. However in the European Union the regional landfills are preferred on the evidence of environmental aspects both regional and local landfills have reason for existence in Hungary and the restoration of the former district landfills would be necessary.
5. Analysing the landfills out of use in Budapest I pointed out that waste was mostly dumped in former quarries solving landscape conflicts. Unfortunately the territory of these landfills was left uncontrolled, the recultivation failed to happen (usually for economic reasons) causing environmental conflicts (further dumping, stink, unsettled waste). The residential area sprawled around the former landfills so the appropriately recultivated landfills could serve as recreational areas.
6. Establishing new landfills countless economic, geological, environmental aspects have to be taken into consideration. Recently the economic aspects came into the front however these can become very expensive because of future contamination. At marking the location of new landfills we can apply the Maximin-Minimax or positive-negative methods. The method elaborated by myself makes this process easier and shorter.
7. Even the appropriately located and developed landfills can be a delayed action bomb as long as we can make sure that only communal wastes are dumped without any

dangerous component. It cost too much to avoid any possible averages. The self-governments can not meet all these expenses. In case of catastrophe the right location can minimise the damages.

8. On the grounds of the foreign experiments and the Hungarian practice I pointed out that landfills established and operated by the rules and the professional expectations are not dangerous to the residential areas and their environment. Landfills handled with due expertise are not unbearable neighbours. In case of appropriate compensation the population accepts it.

9. The recultivation is very important after closing the landfill. The further utilisation determines the method of the recultivation. Depending on the planned utilisation we can choose between the recultivation forms covered or uncovered by earth. The properly formed surface and planting can make the landfill “invisible”. Even in case of the hillbuilding method the outcome can be a nice rise enriching the landscape. Using existing quarries for waste dumping the landscape conflict caused by mining disappears.
Very important is to analyse the view and loadability for deciding where and how much waste let we dump. We must not establish such forms in the landscape for economic reasons that cause functional, ecological and aesthetic conflicts.

10. I studied the plant species applied in foreign practice during recultivation of landfills and their adaptation possibilities.

11. Making the recultivation plans (landscape plan and selection of planting material) of the former landfill in Esztergom I applied the experiences of my research work.

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