



WASTE MANAGEMENT ASPECTS OF TIMIȘ COUNTY IN RECENT YEARS

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SUMMARY

Today waste is an acute problem that cannot be neglected and should be considered linked to human society. Immediate solutions are needed especially in urban, overcrowded, where consumer society produces huge quantities of waste to store, if not accompanied by recycling create mountains of "garbage" that will pollute the planet. This paper contains an analysis of waste management in Timiș County, Romania, in the last years. It is presented the evolution of waste quantities correlated with increase of population, and the evolution in collection of recyclable waste. A significant increase of all types of waste quantities are shown, which is due both to population growth, whose number increases with time and lack of interest in recycling. But, recent organized and well-publicized actions have had good results by collecting the large amount of specific waste and should be extended to other waste categories.

Keywords: waste; management; population; Timiș County; Romania

INTRODUCTION

Human activities have always generated waste. This was not a major problem if the human population was relatively small and nomadic, but became a serious problem with urbanization and the emergence of large conurbations. Poor waste management has led to water contamination, soil and atmosphere with a major impact on public health. In medieval times, outbreaks associated with water contaminated with pathogens have decimated populations in Europe and even more recently (XIX), cholera was a common occurrence. Direct impact on health due to poor waste management is particularly noticeable in developing countries.

Long-term effects on health of exposure to substances present in waste or products from waste disposal facilities are more difficult to measure, especially when their concentrations are very low and when there are other routes of exposure (e.g. food and soil) [1].

Municipal solid waste are largely made from kitchen waste and yard waste with a high content of organic substance and composting has been adopted by many municipalities because it results at lower cost a new product suitable for agricultural purposes.

Municipal waste management is considered a public service, providing citizens with a system of disposing of their waste in an environmentally and economically way. Quantity and composition of waste generated include basic information necessary for planning, operation and optimizing waste management [2].

Municipal solid waste should be disposed of properly so as to help in protecting the environment and human health and conserve natural resources. During the process of disposing of municipal solid waste, large amounts of greenhouse gas is emitted, resulting in a significant impact on climate change [3].

But more difficult is the management of hazardous waste that has to be made in a safe way, by profitable and efficient methods of collection, transport, treatment and disposal. Selection of treatment and disposal facilities and routing hazardous wastes and residual wastes involves both economic and social concerns [4].

Waste management approach in Romania is based on principles of national and European policy, also internationally recognized, namely: prevention and minimizing waste generation, recovery and reuse materials through recycling, energy recovery, treatment of waste to decrease the quantities and potential dangerous and only at the end the storage.

In Timiș County recyclable municipal waste that are selective collected have to be transported to the point of selection, where the materials are sorted and recoverable materials are delivered to recovered authorized operators.

In the Timișoara City since December 2005 was initiated dual system of recyclable waste collection through a pilot project (implementation action itself Beginning in early 2007) as the end of 2010 will be implemented in the whole city.

Dual collection system involves the free distribution of bins of 240L (in areas of buildings) or low density polyethylene bags of 140L (in areas of houses), properly printed, together with instructions for collection, the collection is accomplished by two fractions, namely fraction of dry recyclable waste (paper / cardboard, plastic, aluminum dose, PET) and a second part represented by garbage fraction which it is hoped that in future will be evaluated. Currently dual collection system is being implemented in the whole city [5, 6].

In the present study is an analysis of waste management in Timiș County, in the period 2003-2009, aiming to unfavorable meaning (ascending) or positive (decreasing) regarding to the amount of waste produced at County level, the categories, subcategories, and progress in collecting materials which are or may be processed by composting in a new useful compound [5, 6].

MATERIALS AND METHODS

The information presented in the paper were provided by Environmental Protection Agency Timiș which monitors monthly quantities of waste collected and recycled by sanitation operators and licensed operators; the agency takes statistical reports from sanitation operators. From these data we followed the evolution of waste management during 6 years, between 2003 and 2008. New achievements for 2009 are shown.

RESULTS

An overview of developments in the quantities of waste generated in the period 2003 - 2008, according to statistical operator / sanitation services is presented in Table I.

**Table I. Evolution of quantities of waste generated in the period
2003 - 2008 in the Timiș County**

Nr. crt.	Main types of waste	Year 2003 tons	Year 2004 tons	Year 2005 tons	Year 2006 tons	Year 2007 tons	Year 2008 tons
1	Municipal and waste from commerce, industry, institutions of which:	149,526.6	169,864.5	226,901.8	242,752.0	254,780.0	299,626.7
1.1	Mixed household waste collected from population	81,852.5	84,456.0	105,841.5	139,910.0	143,930.0	160,155.5
1.2	Mixed waste collected from trade, industry, institutions	46,114.3	66,376.0	84,446.4	68,550.0	56,350.0	107,553.5
1.3	Household waste collected separately, in which:	2,251.2	1,717.3	222.9	290.0	690.0	1,054.8
1.3.1	Paper and paperboard	1,136.9	205.0	51.1	110.0	560.0	613.8
1.3.2	Glass	8.76	34.0	0.30	-	-	180.0
1.3.3	Plastic	41.60	75.5	70.4	120.0	130.0	146.8
1.3.4	Metals	1063.96	35.8	11.3	10.0		2.3
1.3.5	Biodegradable	-	-	-	-	-	-
1.3.5	Other	-	1,367	89.8	50.0	-	112.0
1.4	Bulky Waste	2,452	2,605.9	-	-	20,450.0	4,646.8
1.5	Waste generated and not collected	16,856.6	14,709.4	36,391.0	34,002.0	33,360.0	26,216.0
2.	Waste from municipal services	18,687.7	20,142.0	28,056.0	28,920.0	31,580.0	22,152.9
2.1	Waste from gardens and parks	3,062.7	2,859.0	6,272.0	11,020.0	3,050.0	157.8
2.2	Waste from markets	3,078.0	3,096.0	5,612.0	2,710.0	3,270.0	2,156.3
2.3	Street waste	12,547.0	14,187.0	16,172.0	15,190.0	25,260.0	19,838.8
3.	Construction and demolition waste	9,031.0	1,886.0	3,286.0	10,240.0	25,560.0	31,785.0
4.	Other waste	2,916.0	1,776.2	3,108.7	2,642.7	2,030.0	1,832.7
	Total waste generated	180,161.3	193,668.6	261,352.7	284,557.7	313,950	355,397.4

Average composition of waste in urban and rural areas is presented in Table II.

Table II. Household waste composition in Timiș

Waste Composition %	Paper and paperboard %	Glass %	Metals %	Plastics %	Organic materials %	Other %	Total
Urban environment	11.0	4.9	4.6	8.6	54.0	16.9	100
Rural environment	9.0	4.2	3.9	7.9	65.9	9.1	100
Timiș County average	10.7	4.9	3.5	13.8	52.4	14.7	100

In Table III is presented in the period 2003-2008 population growth and the amount of waste generated.

Table III. Amount of waste generated and the number of inhabitants in Timiș County between 2003 and 2008

Year	2003	2004	2005	2006	2007	2008
Population	661,171	661,593	658,837	660,966	665,956	676,360
The amount of generated waste (tons)	180,161.3	193,668.6	261,352.7	284,554.7	313,950.0	355,397.4

Evolution of waste generation indicator calculated by reporting quantity of waste to County population is illustrated in Figure 1.

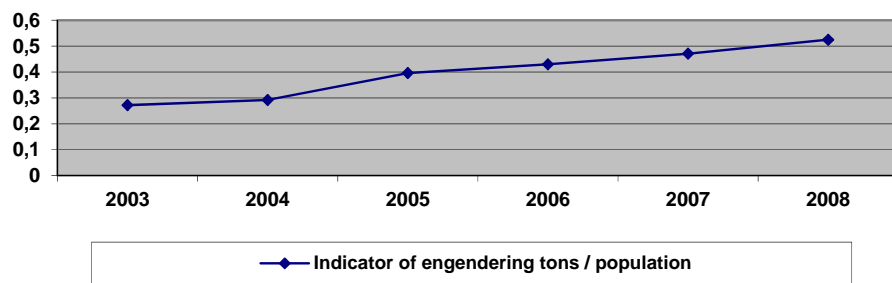


Figure 1. Evolution of waste generation indicator. tons / person / year

Some wastes are biodegradable and can be recovered. Figure 2 reflects the quantities of biodegradable waste stored between 2006 and 2008.

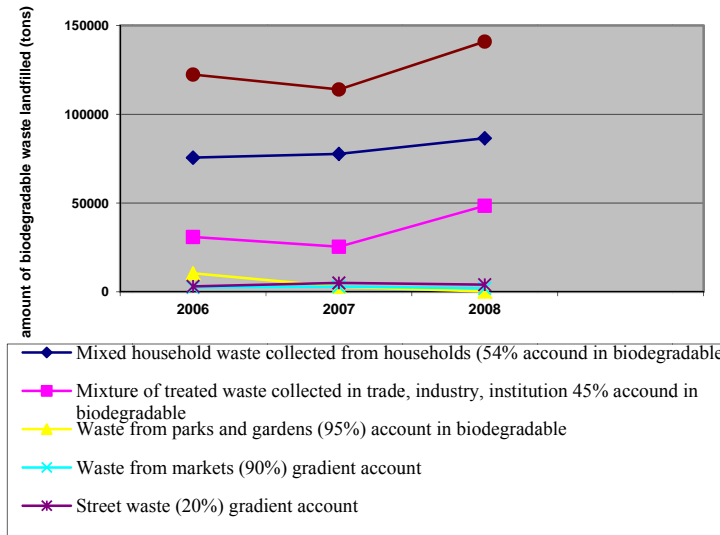


Figure 2. Quantities of biodegradable waste deposited between 2006-2008

In addition to biodegradable waste that can be exploited, packages are a source of recyclable materials that can bring significant revenues to companies that handle their collection. Timiș County collection by authorized companies is more recent.

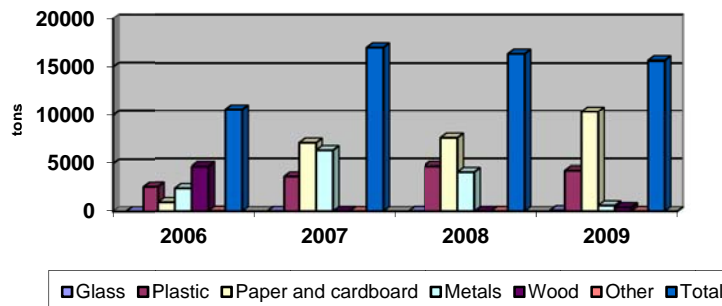


Figure 3. Appropriate packages of packaged products marketed by manufacturers and importers (t) during the period 2006-2009

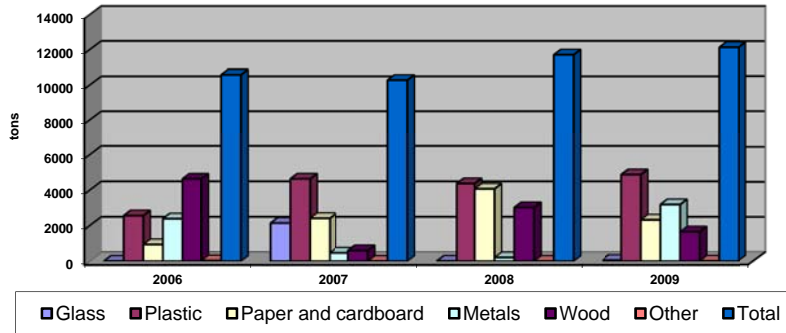


Figure 4. Packaging waste taken to exploit from individuals or corporate by authorized operators (tons) during 2006-2009

Also for recovery are collected electrical, electronic, electrical wastes (WEEE). Evolution of the quantities of WEEE collected between 2006 and 2009 is shown in Figure 5. This action has enjoyed great success in 2009 when it launched "The Great Cutting", as shown in Figure 6.

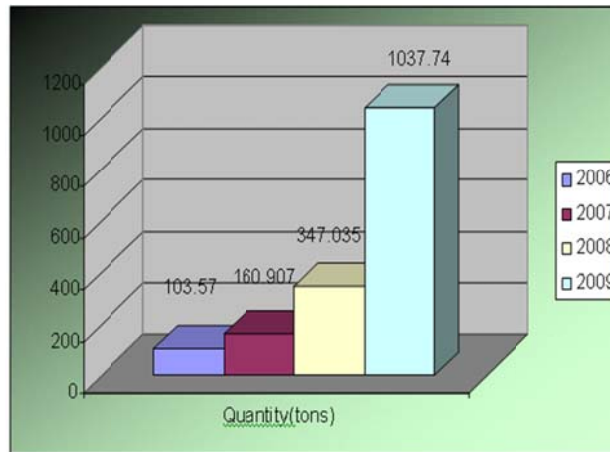


Figure 5. Evolution of the quantities of WEEE collected between 2006 and 2009

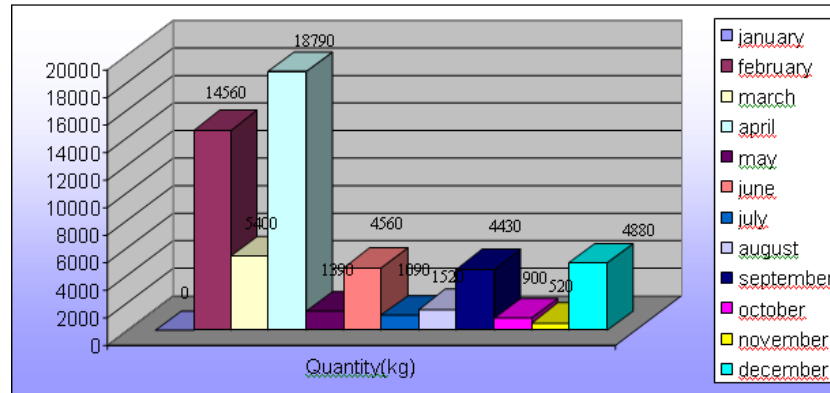


Figure 6. Evolution of the quantities of WEEE collected as part of Great Cutting. 2009

DISCUSSION

As you can see in Table I the evolution of quantities (tons) of waste generated in the period 2003 to 2009 in the Timiș County is very high. The trend is to increase the total amount of waste by increasing the amount of municipal waste from trade, industry, institutions (doubling from 2003 to 2008), waste from municipal services (20% increase in 2008 versus 2003), construction waste and demolition (tripling in 2009 compared to 2003).

In contrast, the amount of household waste collected separately from the class paper, cardboard and metals has reduced, but increased the plastics and glass.

Unfortunately biodegradable materials are not separately collected. Bulky waste nearly doubled and those generated and not collected are also growing.

The average composition of urban and rural waste presented in Table II indicates a higher value by 65.9% from 54.0% in rural areas of organic materials, materials that could be exploited by composting.

Population who are deprived of sanitation services in rural areas is 208,697 inhabitants.

Table III shows a slight increase in population Timiș County (with 15,189 inhabitants in 2003 until 2008, is about 2%) and the amount of waste generated between 2003 and 2008 (nearly double). Therefore the evolution indicator of waste generation (tones of waste generated per capita) represented by Figure 1 also recorded an increase, being significantly since 2005 and reached its peak in 2008.

From Figure 2 which describes the amount of biodegradable waste stored between 2006 and 2008 follows that a special importance should be given to waste collected in

mixture from trade, industry, institutes that registers a significant growth in 2008 compared with 2007. At the same time in waste from parks and gardens there is a less significant decline and street waste is kept stable.

Figures 3 and 4 shows that in 2009 were taken for approximately 75% of total packages differing to 73% in 2008 and 62% in 2007 and as part of packages tacked are paper, cardboard, plastic metals (more than in 2009) and wood.

According to plastic packages corresponding with packaging products placed on the market by manufacturers and importers there is a relative maintained during 2007 - 2009 also recording the highest values of the packages.

Environmental improvement are highlighted in the Figure 4 representing the packages waste taken to exploit, so, there can be seen high level in the case of paper and cardboard recycling which in 2009 exceeds the amount of 10,000 tons.

On the other hand there is a general neglect of wood waste which suffers a drastic decline in the last three years reaching an insignificant level. It can be said that plastic packages shows no large variations that does not mean a particular environmental problem as it remains at a level of approximately 4,000 tones.

The evolution of quantities of electrical and electronic wastes collected in the period 2006-2009 is presented in Figure 5 brings an increase in 2009 to almost 10 times compared with 2006 and almost triple the previous year reported. This growth is due entirely of the "Great Cutting", put into practice by Timiș County Council to collect waste electrical and electronic appliances on Saturday and Sunday, operating under the slogan "Get rid of your junk around."

Through this program, a 2009 analysis of the evolution of quantities of waste electrical and electronic appliances collected, as is found in Figure 6 shows a sharp increase in February when they collected 14,560 kg of waste WEEE. The largest response of the population was recorded in April when they collected 18,790 kilograms.

CONCLUSION

After analysis on the above figures and tables we can deduce:

1. A significant increase of all types of waste quantities, which is due both to population growth, whose number increases with time and lack of interest in recycling. It is important to note that the largest amount of waste generated in the period 2003-2008 consists of mixed household waste collected from households. followed by treated waste collected in the mix of trade, industry, institutions;
2. Differences in composition of household waste between urban and rural areas. the latter with higher percentages of organic materials which could be exploited by

3. getting a compost fertilizer for agriculture;
3. Increasing quantities of waste are related to population growth but also to the rate of waste generation ever greater consumption is explained by the increase of consuming among population;
4. Increasing the volume of packages placed on the market by the producer but also the volume of the recovered packages;
5. Organized and well-publicized actions, e.g. Great Cutting have had good results by collecting the large amount of WEEE. That management model should be developed and implemented on other recovered and capitalized waste;
6. Interest for recycling is not quite the desired although paper and cardboard records a significant degree of recycling, especially in 2009 and also WEEE waste;
7. For a good environmental education should act by: the conclusion of cooperation agreements with educational institutions and start environmental projects, mediating of all actions to protect the environment, sensitize people for constitute an environmental awareness through media and other ways.

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REFERENCES

1. Hargreaves J.C., Adl M.S., Warman P.R., "A review of the use of composted municipal solid waste in agriculture". *Agriculture, Ecosystems and Environment*, **123** (2008) 1–14.
2. Giusti L., "A review of waste management practices and their impact on human health", *Waste Management*, **29** (2009) 2227–2239.
3. Arvind. K., Nema. S.K., Gupta, "Optimization of regional hazardous waste management systems: an improved formulation". *Waste Management*, **19** (1999) 441 – 451.
4. Beigl P., Lebersorger S., Salhofer S., "Modeling municipal solid waste generation: A review". *Waste Management*, **28** (2008) 200–214.
5. Lu H.W., Huang G.H., He L. Zeng M., "An inexact dynamic optimization model for municipal solid waste management in association with greenhouse gas emission control", *Journal of Environmental Management*, **90** (2009) 396- 409.
6. Boer E., Jedrczak A., Kowalski Z., Kulczycka J., Szpadt R., "A review of municipal solid waste composition and quantities in Poland", *Waste Management*, **30** (2010) 369–377.