http://www.natscidiscovery.com
OPEN ACCESS JOURNAL
ISSN: 2149-6307

NSD
Natural Science and Discovery
2015; 1(3): 80-4

Original Article
DOI: 10.20863/nsd.84182

Comparison of Analysis on Solid Waste and Effluent Water Management between Diyarbakir and Batman Districts

Nilgun Onursal[1*], Ali Riza Kul[2], Deylem Onursal[3]

Abstract

Objective: Diyarbakır and Batman are located in the south eastern region of Turkey. The distance between them is less than 100 km. Diyarbakir with a population of about 1,607,437, is the second largest city in Turkey's south-eastern Anatolia region. Also, Batman became a city in 1957 after the discovery of oil deposits starting in the 1940s which resulted in the Batı Raman Oil field, now the largest oil field in south-eastern Anatolia region & Turkey. The oil field caused a rapid and on-going population growth in Batman after its foundation.

Material and methods: Diyarbakır and Batman cities, District Environment Circumstances Reports.

Results: Regarding recycling, Diyarbakır recycles 13.74 % of the waste that is collected and for Batman the percentage is 19.8. Therefore, despite the fact that Diyarbakir shows more development for the amount of solid waste produced by the public Batman municipality is more effective in the manner of recycling

Conclusion: This paper is focuses to "the Comparison of Analysis on Solid Waste and Effluent Water Management" applies to two of the largest cities in the south-eastern Anatolia region.

Keywords: Batman, Diyarbakır, solid Waste, effluent water, waste management

Introduction

This paper, "Comparison of Analysis on Solid Waste and Effluent Water Management" applies to two of the largest cities in the south-eastern Anatolia region.

According to Rajagopalan, V. (2000), Municipal Solid Waste, as known as Solid Waste, "includes commercial and residential wastes generated in a municipal or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes;" [1]

Solid waste in general is a variety of different types of waste which includes household waste, medical waste, hazardous waste, industrial waste and construction waste. In large districts such as Diyarbakır and Batman some sort of the wastes mentioned above are formed in huge quantities. This therefore means that if the wastes are collected from the source, recycling would be possible.

It is quite important to collect, transfer and store the wastes properly because a failure to do so will cause health and environmental problems both in short and long term. In this paper for both of the districts, we have conducted research that analyzes how the wastes are collected from the source, what kind of procedures are used to transfer and the type of storage that is used for the wastes.

Also, if any of these steps are not operated according to the international and national standards; what are the reasons and how might they be fixed?

Apart from collection, transfer and storage of the wastes, it is as much as important to raise a public awareness of how to reduce the amount of waste that is produced and make it more efficient for municipality to manage the wastes. Considering that the education level in the south-eastern Anatolia region is not as high as some of the other regions of Turkey, the response of the public regarding the mentioned subjects is quite important to be observed and improved. Otherwise environmental pollution will be inevitable.

Effluent water is result of activities that include water such as washing, bathing, industrial use of water, rainfalls and etc. Considering that water famine is a rising issue currently, it is potentially a lethal issue that needs to be handled very well. Sewage treatment is possible in different ways which are chemical, biological and physical treatment. If contaminants are dismissed on a high aperture, then it is possible to re-use the water. If the level of contaminants is not reduced enough, then only water will be ready for disposal.

Received: 07-12-2015, **Accepted** 14-12-2015, **Available Online**: 15-12-2015
1 Siirt University Faculty of Education Elementary Section, Siirt
2 Yüzüncü Yıl University Faculty of Vocational School of Health Services, Van
3 Clark University Undergraduate Student, MA-USA
*Corresponding Author: Nilgun Onursal E-mail: nilgun.onursal@gmail.com

http://dx.doi.org/10.20863/nsd.84182

The result of the bioassay (Biological Assessment) experiment will show if the water is ready to be re-used since the experiments are conducted to measure the effects of a substance on a living organism and are essential in the monitoring environmental pollutants.

Both Batman and Diyarbakir have sewage treatment centers and we will display their efficiency, the producers and systems that are used in them according to our collected data. The centers are in control of the municipalities and we will reveal our analysis on whether or not the centers are operated to clean the water to an acceptable degree. If not, what municipalities can do to clean the water to an acceptable degree? Also, the possibilities of improvement gaps will be mentioned and explained for both of the facilities.

Material and Methods

Solid waste in general is a variety of different types of waste which includes household waste, medical waste, hazardous waste, industrial waste and construction waste.

In this research, district Environment Circumstances Reports of Diyarbakır and Batman cities were used for analysis.

Results and Discussion

In large districts like Diyarbakır some of the wastes that are mentioned above are produced in huge levels. Considering hazardous waste, the area is not a top priority to be examined since the sources of activities that consume hazardous waste in Diyarbakır are nearly zero. However household waste, medical waste, industrial and construction waste are important to be managed efficiently for the sake of environment.

For both Diyarbakır and Batman the percentage of the types of solid wastes are shown in Figure 1 and 2 accordingly.

1. Household waste:

The household waste is consistent of different parts; packages, plastic bags and bottles, paper based products, etc.

Diyarbakır has a population approximately 1,607,437 and this population daily produces about 750-ton solid waste. The %90 percent of this waste comes from household activities.

Batman has a population approximately 348,996 and this population daily produces about 950-ton solid waste. The %90 percent of this waste also comes from household activities. It is also important to mention that the oil company manages its own waste, hence, the difference does not depend on the oil related activities.

The difference in amounts between Diyarbakır and Batman is a result of development difference between the cities. Diyarbakir having more population and producing lower amount of solid waste proves that the public is more aware of environmental problems regarding solid waste.

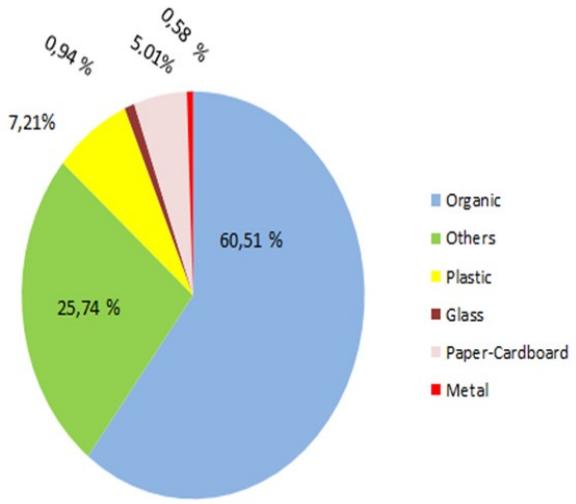

Figure 1: The types of solid wastes in Diyarbakır

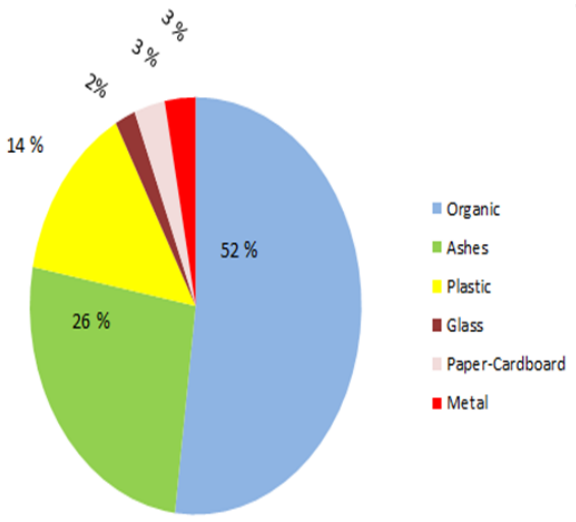

Figure 2: The types of solid wastes in Batman

2. Other types of wastes:

Considering cities like Diyarbakır and Batman medical wastes among other sorts of solid wastes are the most significant because industrial and hazardous wastes are not produced at huge levels, hence, there is not many possible actions or cautions to be taken for reducing or managing those types of wastes. However, Diyarbakır with yearly about 1394.16-ton medical waste production and Batman with yearly about

http://dx.doi.org/10.20863/nsd.84182

338.114-ton medical waste production are two of the leading districts in southeastern region of Turkey.

Therefore, the storage of these wastes, collection and transportation of them, also disposal or recycling of the medical wastes are important. Both of the city municipalities work with a private company to collect, transport and sterilize the medical wastes. Also, during our research, we have asked several employees and they confirmed that sometimes some firms are mixing medical waste into the household solid waste for avoiding the extra cost of it. Yet, both of the municipalities do not have any information about the amount of medical wastes mixed with household wastes.

Regarding construction wastes, districts like Diyarbakır and Batman are also leading in the southeastern region of Turkey since they are lead growing cities in the area there is an ongoing construction process in large areas every year. The construction wastes are transported to the chosen areas in both cities. There are not any available data on the amount of these wastes. More importantly, there is not any management plan for recycling or disposing them.

Below, the amounts of collected wastes are shown in charts taken from "Diyarbakır District Environment Circumstances Report" and "Batman District Environment Circumstances Report" for both Diyarbakır and Batman as Table 1.

Table 1: The summary waste production of Diyarbakır and Batman Regions

		Diyarbakır	Batman
Population	Summer	963,457	348,996
	Winter	963,457	348,993
Approximate Amount of the Solid Waste that is collected (ton/day)	Summer	740	441
	Winter	765	470
Solid Waste produced per person	Summer	0.71	0.72
	Winter	0.71	0.8
Waste Composition (Yearly %)	Organic	60.5	50.6
	Paper	5.01	3.3
	Glass	0.94	2.1
	Metal	0.58	2.1
	Plastic	7.21	12.3
	Ash	25.57	29.6

Collection and Transportation of Solid Wastes:

1. Collection:

For both of the cities, the household wastes from the apartments are usually collected by apartment doorkeeper and is transferred to a container. Residents of the apartments which do not have a doorkeeper transfer their waste to a container by themselves.

There are two types of containers available in the districts; underground and on ground metal containers. There could always be trash around the containers whether if the container is full or not. (Figure 3, 4.)

Also, following problems apply to the both cities as well. To start with, both the doorkeepers and residents do not have a manner or transferring their solid waste to the containers on a regular basis. Therefore, randomized transfer act creates a problem for workers that are responsible for collecting the waste from containers and transferring them to the storage area since they cannot constitute an effective working schedule because most of the areas needs to be visited more than once a day. Due to being not able to optimizing work load sometimes containers get full and trash takes place around them and this pollutes the area and if rain falls the water gets polluted as well. Apart from over loading of the containers, sometimes even if the container does not get full, yet the solid waste stored inside the container stays there for a long interval of time then the bacteria production starts and this is also dangerous for the environmental health. Add to this, some street animals also feeds themselves from the trash containers when there is a trash around the containers and considering their interaction with the environment it is another health issue for the public.The difference for the medical waste collection is that since medical waste is produced by organizations and stored in a different container, collection process is more organized since there is a pattern followed by both the institutions and the municipality.

Figure 3: Waste container type 2

http://dx.doi.org/10.20863/nsd.84182

2. Transportation:

Both of the municipalities have their own transportation vehicles and these vehicles are being used to collect the wastes and transport them to the storage area. The types of vehicles used for medical waste and household waste transportation are different. Considering construction wastes, companies operating the construction transports the wastes separately with their own vehicles.

Disposal and Recycling of Solid Waste:

1. Disposal:

Both of the cities use hazardous storage areas. Although this method is not quite effective and will eventually result in pollution, it has been an ongoing method for many years for the cities.

The good aspect of this problematic method for the cities is that they have a management plan for the hazardous storage; hence, water contaminated by the waste does not directly go to the underground. Also, the gas levels produced by the waste are under control. Therefore, although the method used is not the most efficient one at least it is being used efficiently.

2. Recycling:

Regarding recycling, Diyarbakır recycles 13.74% of the waste that is collected and for Batman the percentage is 19.8%. Therefore, despite the fact that Diyarbakir shows more development for the amount of solid waste produced by the public Batman municipality is more effective in the manner of recycling.

If both of the cities apply fully applied decomposition of the materials that are collected from solid waste containers, yearly solid waste amount will increase up to 19.78% and for Batman the percentage will be 33.9%. Therefore, reduction in solid waste capacity will result in less environmental pollution and also lower financial costs. However, both of the cities do not apply full capacity decomposition.

Solid Waste vs. Technology:

The connection between solid waste and technology takes an important part in the solid waste management as well. First of all, as technology evolves and improves, hence, standard life quality of humankind enhances accordingly, as well as word globalizes more which makes for people to reach all sorts of products all around the globe easier thus consuming culture takes a wider impact on the human daily life which results as more production of the solid waste and other types of wastes. This results as polluting the environment and natural resources. However, there is a vice-versa effect of technology on the matter of solid wastes since with the evolving technology management, disposal and recycling of solid wastes are far more improved and easier if the technology is used efficiently. Not that it means in every society these variations of technology are used properly, even worse without the proper conscious level usually lacks using technology for the matters mentioned above and therefore technology's impact on solid waste is one way; for environmental pollution.

Effluent Waste comparison of Diyarbakir and Batman:

a. Diyarbakır:

In Diyarbakır there is a physical effluent water treatment center. Yearly capacity of the center is 61.000.000 m3 and last year 31.276.000 m3 is treated.

There is a still continuing construction of a biological effluent water treatment center in Diyarbakır. The approximate cost for the project is 78.800.000 Euro. Since biological centers for treating water is the most effective, after the compilation of the center, bioassay levels for the treated water will be better compared to the physical center's results. Below you can see the photographs of the construction area for the center in Fig. 4 and 5.

Figure 4: Diyarbakır biological water treatment facility

There is also a physical effluent water treatment center in Batman. Yearly capacity of the center is 22.265.000 m3 and last year 14.636.500 m3 is treated.

http://dx.doi.org/10.20863/nsd.84182

Figure 5: Diyarbakır biological water treatment open-air facilities

There are not any other ongoing projects in Batman for the effluent water treatment. Also, seeing that physical effluent water treatment already reached 75% of its full capacity and considering the population of the district is increasing day by day and the development of the district is still rapid it is fair to say Batman needs a future plan for water treatment.

Discussion

Both Diyarbakır and Batman stores their solid waste with hazardous storage method. This results negatively for both human health and environmental health. Since Diyarbakır has a wider living area and more concentrated population, the resolution regarding solid waste management and effluent water management should be enhanced prior to Batman for Diyarbakır. Not that Batman should be neglected; rather there is a need for a resolution regarding Batman as well.

The public awareness should be raised in order for people to react against solid waste carefully. This will also help to reduce responsibility and financial liabilities for the governing buddies.

Solid waste collection, transportation and disposal / recycling costs must be reduced by better management and planning with the help of the public. Also by reducing the produced solid waste and effluent water the damage for humanity and environment must be reduced as well. By this we can offer a better future for the youth.

Conclusion

For industrial wastes and hazardous wastes, the governing powers should have a better observation organization. Also the company owner should be informed about how to reduce, store and transfer these sorts of wastes.

Finally, by applying an efficient recycling policy we can re-use the solid waste, hence, our damage against the environment will be lowered.

Conflict of Interest: The authors declare that, there are no conflicts of interest between the authors. The authors alone are responsible for the content and writing of the paper.

References

1. Rajagopalan V. The GAZETTE OF INDIA [Internet]. Envfor.nic.in. 2000 [cited 11 December 2015]. Available from: Http://envfor.nic.in/legis/hsm/mswmhr.html
2. Diyarbakır Governorship. Diyarbakır District Environment Circumstances Report. Diyarbakır: Diyarbakır Province; 2013.
3. Diyarbakır Municipality. Diyarbakır Solid Waste Storage Unit Plan. Diyarbakır: Diyarbakır Municipality; 2014.
4. Batman Governorship. Batman District Environment Circumstances Report. Batman: Batman Province; 2013.
5. Batman Municipality. Batman Solid Waste Storage Unit Plan. Batman: Batman Municipality; 2014.
6. Neyim C. Çevre ve sürdürülebilir kalkinma tematik panel. Presentation presented at; Tübitak, Ankara.
7. Katayanagi K. Solid Waste Management Planning: Master Plan of Appropriate Municipal Solid Waste Treatment Considering Plastic Waste. [Internet]. Environmental Control Center Co., Ltd; 1994. Available from: https://www.jstage.jst.go.jp/article/wmr1990/5/4/5_4_326/_article
8. Kocasoy G, Can O. UKAY 2014.
9. Kavaklı M, Civan Z. Türkiye'de su kullanimi, atiksulari geri kazanma ve yeniden kullanma uygulamalari. [Internet]. [cited 11 December 2015];. Available from: http://www.mmo.org.tr/resimler/dosya_ekler/996535e07258a7b_ek.pdf?dergi=178