

# ECO-EDUCATION AS AN ELEMENT OF MUNICIPAL WASTE MANAGEMENT SYSTEMS IN POLAND

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ABSTRACT

The generation of municipal waste is inextricably linked to human functioning. In Poland since 1 July 2011, as a result of legislative changes, the approach to municipal waste has changed. Since then, municipalities have been the owners of waste and are responsible for achieving the appropriate levels of indicators imposed by European legislation. These changes necessitate the need for solutions that will teach residents of individual municipalities to segregate waste and the use of specific discipline imposed observance of the waste collection schedules. Different municipalities use different methods of educating residents to separate waste. In most cases, the greatest emphasis is placed on school age education. The knowledge passed on to children is also addressed to adults. The article presents examples of the use of eco-education used in the management of waste management systems in Poland.

## Introduction

Ecological education also called as environmental education is the concept of educating and upbringing the society in a spirit of respect for the environment according to the motto to think globally – to act locally. Ecological education is also defined as a psychological and pedagogical process of influencing people to shape their ecological awareness (Dobrzańska, Dobrzański, Kielczewski, 2008).

In the management of municipal waste management system in Poland is very important effect of environmental education activities is the amount of separately collected waste. Formation of these values demonstrates the level of awareness of citizens. It should be remembered that the overall amount of waste increases with an increase in quality of life (Budică, Buşu, Dumitru, Purcaru, 2015). The ratio of waste collected selectively to total waste is shown in Table 1.

**Table 1.** Municipal waste collected selectively in relation to the total of municipal waste collected in the year 2010–2015 (%)

Waste collected selectively	2010	2011	2012	2013	2014	2015
Total	8.6	10.0	10.5	13.5	19.8	23.4
From households	8.7	9.8	10.5	14.4	21.2	25.1
Paper and cardboard, metals, glass and plastics	5.3	6.3	6.8	7.9	9.5	9.1

Source: selected data from Central Statistical Office of Poland. Retrieved from: <http://stat.gov.pl>.

In recent years, segregation of waste in Poland is systematically gaining in popularity. In total, in the years 2009–2015, 16 major studies on environmental awareness, attitudes and behaviors were conducted in Poland (TNS Polska, 2015). In 2014, the proportion of people who regularly segregated waste was 68% (TNS Polska, 2014). The data in Table 1 also indicate a significant increase in the amount of municipal waste collected selectively between 2010 and 2015. The largest increase was recorded in the field of municipal waste collected from households. Over the five years studied, this level has increased almost threefold.

## Regulations on proper sorting of waste

From 1 July 2017 it started to apply Regulation of the Minister of Environment of 29 December 2016. On the detailed method for the selective collection of selected waste fractions (Rozporządzenie..., 2016). It specifies precisely how waste should be segregated, including the division into fractions and the color of the containers in which they are to be segregated. It was called the Joint Waste Separation System. The Ministry of the Environment has introduced a transitional period for municipalities to implement common rules.

On the exchange of containers in the appropriate colors municipality will have five years. So the community will have to do it up to 30 June 2022. If it is not possible to replace containers quickly, it is possible to use existing ones. Each of them must, however, be properly labeled. The labeling of existing containers must be applied within no more than 6 months from 1 July 2017. According to the regulation, 5 fractions will be selectively collected: paper, glass, metals, plastics and biodegradable waste. The paper is designed for a container or a bag in blue color. The glass is designed for containers and bags in green. Metals and plastics should be placed in yellow containers and bags. Fractions of plastics and metals have been combined because most waste management installations are equipped with devices that can easily separate metal from any waste stream. These devices use ferromagnetic properties of metals. Another fraction is biodegradable waste. These are designed for containers and bags in brown.

The rest of the waste is mixed municipal waste – collected in black containers. These wastes are most often subjected to further processing using mechanical and biological waste treatment. The use of this method significantly reduces the amount of waste deposited in landfills (Siemiątkowski, 2012).

Another possibility is to use thermal conversion of waste. Various solutions of this type are widely used throughout the world. In Poland, these technologies are still rarely used, but in many regions they are currently working in this direction (Jurczyk, Koc-Jurczyk, 2017).

Implementation of the requirements introduced by the regulation (Rozporządzenie..., 2016), brings order in terms of the existing rules. This order and harmonized rules are essential for the effective implementation of nationwide education campaigns. Successful implementation of these campaigns gives the opportunity to apply the principles of sustainable development.

### **Additional options for sorting waste**

This regulation does not introduce the need for separate collection of other waste, which in the majority of municipalities are already collected selectively. Municipalities maintain points called Municipal Waste Collection Points and most often the residents bring waste to them by themselves. However, part of the fraction is received at the source.

This group includes ash from the furnace, usually collected in black or gray containers during the heating period. The necessity of ash picking is due to separate regulations and is related to the high toxicity of ashes and the presence of rare elements in them (Bielowicz, 2013).

Separately collected are also building demolition waste, such as rubble, wood from demolition, gypsum boards, window and door glass, window and door frames, roofing materials, installation waste from households. In many municipalities, containers made of strong material called big bags are used to collect these waste.

Residents are also encouraged to selectively rendering bulky waste. This group includes most often: liner, carpets, wooden and plastic window frames, wood packaging type pallets, furniture like tables, chairs, wardrobes, couches, mattresses, fridges, washing machines and others of large dimensions (Pasicznik, Banaszkiwicz, Klodziński, 2016).

Separately should also be collected electro-waste, problem and dangerous waste and hazardous waste. These include: overdue drugs, chemicals, used batteries, accumulators, electrical and electronic equipment of small dimensions, plant protection agents, acids, paints, inks, lacquers, fluorescent lamps (Budică, Buşu, Dumitru, Purcaru, 2015).

Separating hazardous waste from mixed municipal waste streams is extremely important. Only the inhabitants can do this effectively, by separating the waste at the source. If hazardous waste goes to mixed waste, they often land in landfills and from there they can penetrate directly into the environment. In the case of drugs it is particularly dangerous if they penetrate the water to pollute it. Of the remaining waste batteries are particularly harmful. It is relatively easy for every citizen to selectively collect and donate them because they do not take up much space. Currently, most shops and public institutions in Poland are containers for used batteries. In addition, many municipalities among children in schools are run competitions for collection and accumulate as many batteries. In the case of batteries entering the dump, they release hazardous substances, very toxic to humans, such as cadmium (Ulfik, Nowak, 2014).

Many municipalities, especially urban and urban–rural ones, also provide for the selective collection of green waste (leaves, grass, branches, bushes). For this purpose, selective Green Waste Collection Points are used, depending on the needs, most often in neighborhoods where there is single family housing. With biodegradable

waste energy recovery is possible (Kot, Ślusarczyk, 2013). In rural areas, residents are most often encouraged to self-compost green waste and use it as a fertilizer compost (Bajdor, Starostka-Patyk, Lis, 2016).

### Segregation and recycling – lifelong learning

In addition to the content on the ecology carried out in the school curriculum in Poland has also been implemented and conducted many education programs for adults also. They were made possible by the national unification of the principles of waste segregation from 1 July 2017.

The Ministry of the Environment in order to educate the public has carried out a large social campaign, whose main slogan was: „Waste is not rubbish and raw materials can be reused.” The new Internet service „Our Garbage” was launched at <http://naszesmieci.mos.gov.pl>.

According to the ministry recommendations, the entire segregation process that residents are expected to perform can be presented in three simple steps:

1. Separation of what can be recovered, or recyclable materials, in particular plastic or metal, paper, glass and biodegradable waste.
2. Attention to hazardous waste. Never throw them in mixed waste. Batteries, incandescent bulbs and fine electrolytes should be disposed of in special containers in shops. Outdated medicines and used medical equipment (such as syringes) should be discarded in special containers in pharmacies.
3. The container mixed municipal waste should be disposed of only what can not be recovered, eg. paper towels and tissues, diapers, sanitary napkins, greasy paper.

One of the main causes of residents' dislike for waste separation is that of earlier years. Residents knew that often segregated waste went to one common garbage truck and there were mixed up. All work involving the segregation of waste at source, that is, where they arose, and went in vain and many Poles became discouraged. Meanwhile, this has changed. Modern vehicles receiving segregated waste typically divide into different septic tanks to which individual waste is disposed. Another solution is to receive each type of waste by another garbage truck. In some municipalities arrangements are containers for selective collection, which must be fully exported to the plant for processing waste, in order to be emptied. Empty containers are replaced in their place. Most often, this solution applies to containers of „bell” or containers mounted under the ground (above the ground is only a small, aesthetically appealing basket).

The program „Our Garbage” is one of the largest national programs. It should be noted, however, that practically every municipality in cyclical activities are carried out in the field of environmental education. They aim to make people aware of how important it is to take care of the proper management of municipal waste.

Many waste such as glass and aluminum are 100% recyclable and can be processed an infinite number of times. In the case of aluminum, it is important that the production of aluminum from ores is relatively expensive and the deposits of bauxite are not renewed. By recycling the glass we can reduce the consumption of sand, dolomite and soda. By putting only one glass bottle into the secondary circuit, we reduce energy consumption by 4 hours to 100 watt incandescent bulbs. Meanwhile, a statistical resident of Poland throws in containers of mixed waste with 56 glass packages a year (<http://naszesmieci.mos.gov.pl>). It is worth to change habits and to dump less.

Plastics are made from petroleum derivatives. Instead consume oil, whose resources are limited and the production is very expensive, plastics can be reused – as a high-calorie source of energy or as a secondary raw material. For example, from 35 popular PET bottles, you can make a fleece sweatshirt. Plastic can also be

processed into other specialized or athletic clothing, and tents, backpacks and boots are also created. To save a tree, only 59 kg of waste paper is enough (<http://naszesmieci.mos.gov.pl>). If the product has to be packed, choose the ones that can be easily recycled (Zarębska, 2014). It is also important to remember that transporting products first and then waste later also has negative environmental impacts (Bajdor, Ulfik, Nowak, 2014). If possible, choose products and goods, which are produced as close as possible in accordance with the principles of sustainable development (Kot, Ślusarczyk, 2012). Companies should also follow the rules promoted in ecological education (Wysocki, 2016).

## Conclusions

It is necessary to continually educate the public on proper waste segregation. The easiest way is to segregate wastes where they arise, and in the case of municipal waste are houses and apartment citizens. A common barrier in this regard is the lack of space for storing of segregated waste. Legal regulations introduced in Poland in this area have arranged the principles of waste segregation. Many municipalities have decided to significantly raise prices for waste collection from residents who declare that they do not want to segregate waste – often this price has doubled. Such a way of “encouraging” the segregation of waste, in many municipalities has brought very rapid results in the form of avalanche changes in declarations regarding the segregation of waste.

Introducing the waste division into 5 fractions: paper, glass, metal and plastics, biodegradable waste and mixed municipal waste, gives a realistic chance for residents to fulfill their obligations to separate waste collection. From local governments depends, however, to what extent they will facilitate the residents of separately collected waste collection, including scheduling reception facilities. For residents the most convenient solution is frequent collection of waste, due to the lack of need for their long-term storage (the need to have storage space and inconvenience associated with the stench). On the other hand, keep in mind that each waste collection are real costs that will have to bear the residents. Compromise on waste separation is much easier to understand when residents have knowledge of municipal waste management and understand the need to recycle waste. Eco-education is an indispensable factor in this case, giving real benefits to the inhabitants and the environment.

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