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HAZARDS RELATED TO COLLECTION, TRANSPORTATION AND DISPOSAL OF URBAN WASTES IN TIRANA MUNICIPALITY

Abstract: *The purpose of this study is to investigate the environmental issues that accompany the entire process of waste collection, transportation and disposal in Tirana Municipality. Municipal (urban) waste management has emerged as one of the greatest challenges facing environmental institutions in Tirana and elsewhere in Albania. Urban waste management is characterized by inefficient collection methods, insufficient coverage of the collection system and improper disposal of wastes and a poor environmental awareness on the part of residents. The study also provides a detailed examination of municipal wastes (organic and inorganic ones), solid wastes in the form of demolition materials hauled from construction firms, household items etc. The study does a risk analysis of the damage to environment in the way of quantification of wastes that is based on the source of collection-transportation-target disposal point and brings to light issues that are of environmental concern.*

Key words: waste collection, processing, waste disposal, urban waste management

INTRODUCTION

Tirana is the capital city of Albania with a population within city limits estimated at 421,286. Tirana and the immediate surrounding areas have a combined population of 763,634. Many communes and villages have merged with the city due to urban sprawl and unplanned urban development, so they can be viewed as constituent parts of Tirana. The city is mostly surrounded by hills with Dajti Mountain on the east and the presence of an artificial lake that is extensively being utilized as a recreational area for the Tirana residents. The Municipality of Tirana is divided into 11 smaller administrative units referred to as Municipal Units.



Figure 1. Map of Tirana city

The Government of Albania has passed various laws and regulations that are intended to safeguard the environment. One such law is urban waste law [9], whose scope is 'to protect the environment and health from pollution and damage from solid wastes during the entire process of collection, sorting, transportation, recycling, processing and disposal'. The law further suggests that 'harmful wastes should be properly disposed and their presence be reduced to the largest

extent possible'. Pursuant to the law [9] each local government in the country has set up its own environmental protection body for the protection and improvement of the environment within its jurisdiction. One problem of huge concern is the collection and processing of municipal waste generated by the city residents. Municipal waste is defined to 'include refuse from households, non-hazardous solid waste from industrial, commercial and institutional establishments (including hospitals), market waste, yard waste, and street sweepings'.

The rapid changes in Albania as well as in the rest of other developing countries concentrated huge numbers of people in urban areas of very high population density and added new sources of wastes from shops, institutions and small-sized factories which were set up to employ the immediate population. Under such conditions, it is almost impossible to handle and accommodate these wastes, arising at a rate of up to one ton/family/year within the urban areas [2]. Most of the time waste generated ends up not being collected but dumped in many areas. One to two thirds of the solid waste generation in developing countries is not collected [4]. It is understandable that the disposal and transportation of solid waste in Tirana has added to major waste management problems.

According to the data obtained from the Regional Environmental Office the cities which pose the greatest environmental risks are Tirana, Durrës, Fieri, Vlora, and Elbasani [6]. These cities are also the most densely populated cities with huge population concentrations that were mainly the result of inner migration movements and shifts. According to various studies, Tirana city produces the most wastes of all cities. The total amount of waste generated is roughly 22.700 tons

per day. The total amount of wastes generated at the country level is some 40 000 tons [8]. Wastes volumes in these cities are not constant throughout the year, there is variation based on various factors. Waste characteristics vary according to season, income level, population, social behaviour, climate, and industrial production, the size of markets for waste materials and the extent of urbanization, effectiveness of recycling, and work reduction [2]. There is little or no recycling at the country level. By contrast, in UK household waste alone accounts for only 9% of total waste, a high proportion is land-filled and recycling rates are low [1, 7]. Recycling is a method of solid waste management like controlling or incineration, but is environmentally more desirable [3].

Tirana city does suffer from problems related to overpopulation that in turn has triggered extensive waste generation, high levels of air and water pollution. Air pollution has worsened in the past two decades because of problems related to the number of old cars used in the city. Another source of pollution is inhaled particulate matters and NO₂ gases, resulting mainly from rapid growth in the construction of new buildings and expanding road infrastructure [8].

MATERIALS AND STUDY

For purposes of the current study an investigation in the field in Tirana city was conducted to analyse the entire process that started with the disposal of households in the garbage bins as the first collection point at the quarter level, the transportation of garbage to the wastes dump and the wastes handling at the dumping site (now a landfill). The focus of the study was the analysis of make-up/composition of the garbage generated by the households, the nature of wastes at the garbage bins and the methods of collection. Trips were frequent to the dumping site to observe the processes of sorting garbage along with the process of handling them. The analysis also involved examining the contents of random garbage bins by way of their physical and chemical properties with a quantification of such wastes occurring randomly. Also the residents, scavengers, private contractors were interviewed to confirm the collection, disposal and treatment procedures, recycling practice and problems facing solid waste management.

Results and discussion of the study

Pollution deriving from *at-the-source collection of urban wastes* in the bins poses health hazards to the population in the various quarters of Tirana city. In most cases, such wastes are carried in shopping plastic bags (not the garbage bags) which burst open and spill out into the streets which become a source of pollution to residents in apartment buildings located in the vicinity of designated places where garbage bins are located. The pollutants present in such places are mainly of a solid, liquid and gaseous nature. The garbage bins in turn are located in areas designated by

the mini municipality units of Tirana city. They are located in areas very close to the apartment buildings, at times remotely located and not well-placed because households find them as inconvenient and throw wastes almost anywhere invading public spaces. There is 2-3 garbage bins for each waste collection point which are used for wastes disposal by a total of 100 households in any given area.

Often one thinks of the garbage bins at the source as containing mainly domestic refuse of mixed materials, i.e. glass, metal, kitchen wastes, ashes from fires, broken utensils, papers and worn-out clothing. Yet, a common sight in the garbage bins is the disposal of worn-out furniture which urges the second-hand collectors (scavengers) to rummage through the contents of the bins scattering refuse around the spot where such bins are located. Environmental awareness of such residents needs to be raised further because such activities harm not only those handling such wastes, but also the population in the vicinity.

In addition, municipal wastes are rich in organic matter and consist of various ingredients such as animal residues, dairy or slaughterhouse wastes. These may seem to be eco-friendly to some extent but overpowering odours and health hazards are inherent in them. The following table presents the type of wastes and the source they come from in a given designated bin spot in Tirana.

Table 1. *Characterization of household wastes at the point of collection*

Type of wastes	Characterization of wastes	Source of wastes
Food wastes	Garbage (prone to decompose)	Originate from food products of animal and vegetable origin, arising out of preparation, processing, handling, catering, and eating.
Rubbish	Combustible Non-combustible	Paper, cardboard, worn-out furniture textiles, plastics, rubber, etc glass, ceramics, metals, etc.
Construction/Demolition materials	Construction materials Demolition of materials	broken pieces of bricks, stones, plasters, dirt, sand, wooden articles, metal pieces, electrical parts, etc.
Others	Organic wastes	slaughtered parts from the various butcher's shops etc.dairy wastes etc

The following graph is indicative of the percentage of wastes generated on a single day at any given designated dumping place where bins are provided for.

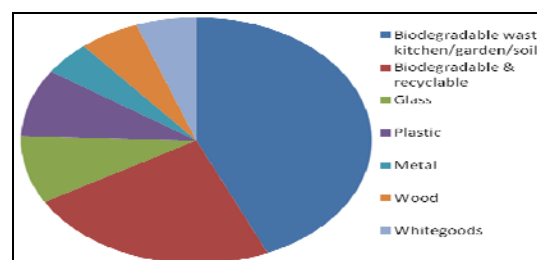


Figure 2. *Percentage of composition of municipal wastes*

The total number of particles in the wastes examined varies largely. A sample of large wastes shows average moisture content of 10-15 % and the moisture content tends to increase with increase in food wastes. Components like food wastes, garden wastes and others contribute to the higher densities of the main mass of wastes, ranging from 130 to 1500 kg/m³, a typical waste sample exhibits average density of 1200 kg/m³. There is also an increase in dry and inert components, i.e., ashes and cinders, which decreases the average density. This has great significance for the transport and storage aspect of the municipal wastes.

With changing patterns of living style and human cultural activities, waste composition is also changing over the years. It is noteworthy that plastic and paper components have increased and likely to maintain this pattern throughout, whereas, glass is likely to decline in the coming years. The content of glass and plastic in the bins has increased the activity of those collecting such items at the source for recycling purposes. Yet the recycling of plastic is considered to be a problem because most of them end up being re-used again, where most plastic may be traced to dangerous materials used previously. At the moment there is a piece of legislation passed which is intended to curb the use of recycled plastic, mainly for plastic bags, since they are deemed to be hazardous to human health.

WASTES COLLECTION PRACTICES

Tirana municipality has outsourced a private contractual waste collection company that deals in collecting municipal waste. There is no categorized municipal collection say organic, glass, metal, textile etc., as is the case in other advanced countries. In some countries, notably Estonia and Hungary, the introduction of separate collection schemes for biodegradable packaging waste (paper, cardboard and wood packaging) pursuant to the Packaging Directive [5]) has helped initiate the diversion of biodegradable waste from landfill. In Albania the collection practice is hugely influenced by climatic variations that at times trigger the spreading of foul odours that are a nuisance to the residents within the designated dumping places. At times, they become the focal point of stray dogs that become menacing to the passers-by who have to use the sidewalks to get to their destinations. Most of these dogs are not vaccinated and there have been high incidences of pedestrians seeking immediate medical help because of the dog bites. At times the holding tanks result in undesirable spill-over or strewing of portion of household wastes on the streets. During hot weather the bins become infested with swarm of flies and other insects which become a source of spreading various diseases.

At times the designation of bins (dumping places) is not well planned to accommodate the huge volume of wastes generated by the enormous number of population in a specific area. There are areas within a certain quarter which are densely congested with residential buildings. The total number of capita per

unit of bin is quite high in areas where multi-story buildings are present. So the generation of refuse is pretty huge in such areas. There is a need for collection policies to change in such areas with a need for an increase in the frequency of garbage pick-up during the 24 hour pick-up schedule.

Problems with Sharra landfill in the vicinity of Tirana

Some efforts have been launched to rehabilitate the Sharra garbage dumping spot because it was considered to be the most dangerous spot of wastes disposal in Tirana. Due to some interventions in the dumps the beginning of a landfill were in the making but the location of the landfill in the vicinity of Tirana falls short of meeting standards of elaborate and expensive landfills which require a detailed planning, a feasibility study and the consideration of many environmental and health issues.

Problems with this landfill relate to the *location*, which is very close to the Kombinat quarter in the outskirts of Tirana, a densely-populated part of the city which has swelled beyond its holding capacity particularly after the 1990s. It also poses health risks to a number of residents, who due to poor and inadequate urban planning have settled around the landfill. The gases released from the landfill are of huge consequences to the health of residents which has resulted in a high incidence of related-lung diseases. A persistent burning of wastes release gases that are poisonous in nature and harmful to humans. Pollutants released from burning waste are transported through the air either short or long distances, and are then deposited onto land or into bodies of water. The most prevalent of such harmful pollutants include carbon monoxide, carbon dioxide, and nitrogen oxides which are emitted from burning household waste. Chemicals commonly detected in the smoke include benzene, styrene, formaldehyde, polychlorinated dibenzodioxins (PCDDs; also known as dioxins), polychlorinated biphenyls (PCBs), polychlorinated dibenzofurans etc. Another problem that is of serious consequences to the health of citizens relates to the overwhelming odors that can be felt in the surrounding areas.

CONCLUSIONS

There is a need to improve the municipal waste management plans in Tirana city. There is room for improvement concerning the adoption of legislation that reflects the European directives on waste disposal and landfill infrastructure. In addition, the city should initiate separate collection of bio-waste to divert waste from landfill. There is a need to start sorting wastes right at the initial stage of waste collection. The city should start utilizing wastes for production of energy and not incinerate wastes at the dumping place since damage to environment is irreparable. The landfill is not capable of handling all of the wastes generated by the city. Hence the need for another landfill in a place

that should be well studied and examined by taking note of the best standards in landfill construction as European directives require. The study suggests the need for a more extensive study of institutional, political, social, financial, economic and technical aspects of municipal solid waste management in order to achieve sustainable and effective solid waste management in Tirana city.

ACKNOWLEDGMENTS

The waste study of the Municipality of Tirana and the surrounding areas referred to in this paper was part of a joint effort of the three authors, under a previous project, who have long shown an interest in solving waste issues according to the best practices implemented in other European countries. Yet, there is a need to finance studies of the sort in other hot-spots in Albania in order to address issues that arise with waste disposal and landfill management.

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BIOGRAPHY

Arjan Shumeli is a lecturer at Agricultural University of Tirana. He holds both a Master's degree in Linguistics from Ohio University and a Master's degree in Environmental Studies from Agricultural University of Tirana.



He has an interest in ecology and in broader environmental issues. He has contributed a number of papers to various environmental journals both at home and abroad.

OPASNOSTI VEZANE ZA PRIKUPLJANJE, PREVOZ I ODLAGANJE URBANOG OTPADA U OPŠTINI TIRANA

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Apstrakt: Cilj rada je istraživanje problema životne sredine koji obuhvata kompletan proces sakupljanja, transporta i odlaganja otpada u opštini Tirana. Upravljanje komunalnim otpadom je jedan od najvećih izazova sa kojima se susreću institucije koje se bave zaštitom životne sredine u Tirani i drugim mestima u Albaniji. Upravljanje komunalnim otpadom karakterišu neefikasne metode prikupljanja, nedovoljna pokrivenost sistema prikupljanja i nepropisno odlaganje otpada. U radu je takođe dat detaljan pregled komunalnog otpada (organski i neorganski otpad); čvrst otpad koji čini otpadni građevinski material iz građevinskih firmi, otpad iz domaćinstva, itd. Ova studija prikazuje analizu rizika ekološke štete kroz kvantifikaciju otpada koji se nalazi na tački gde se vrši prikupljanje, transport i odlaganje otpada, baveći se pitanjima koja su od ekološkog značaja. Cilj ovog istraživanja je pružanje pomoći departmanima u upravi za upravljanje otpadom u opštini Tirana, kao i donosiocima odluka na centralnom i lokalnom nivou i različitim stakeholderima u implementaciji odgovarajućih metodologija za prikupljanje i odlaganje komunalnog otpada.

Ključne reči: sakupljanje, prerada, odlaganje otpada, upravljanje komunalnim otpadom.