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MANAGEMENT OF HOUSEHOLD AND SIMILAR WASTES IN ALGERIAN CITIES: A COMPLEX MANAGEMENT

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Abstract

The proliferation of household and similar wastes in Algerian cities is a serious problem with regard to effects they cause on environment and health. They are usually wrapped in plastic bags and simply deposited on the level of public spaces. Streets, alleys, squares and sidewalks are not spared. Public space is then attacked by all sorts of rubbish polluting the built and the entire environment. Household and similar wastes don't rise (for this moment!) enthusiasm of people nor local authorities despite of considerable efforts of the State. The problem thus lies in their management which remains insufficient. This article attempts to show that the management of household and similar wastes remains difficult for a city that has not consolidated a waste policy. The various stages of waste's life as well as of chain collection, storage, sorting, recycling, treatment and valorization are then a complex management.

Keywords: Household and similar wastes, complex management, Algeria.

1. INTRODUCTION

The rapid urbanization of Algerian cities results in a growth rate of generated wastes that local authorities are not prepared to face. For years, these were more concerned with the collection and disposal of wastes without trying to approach a technical and rational manner despite of state's efforts and legal and range regulatory tools implemented. Among the regulatory and legal tools, we can cite for example: law N° 83-03 of February 5 th, 1983 relative to the environmental protection; decree N° 84-378 of December 15 th, 1984 fixing conditions of cleaning, removal and the treatment of urban solid wastes; law N° 03-10 of July 19 th, 2003 relative to the environmental protection in the context of sustainable development… Waste collection starts with the pre-collection at households' residence with garbage dumpsters. Garbage dumpsters are often equipped with a rotor mill which fragments and compress wastes. Management of household and similar wastes, in accordance of the law N° 01-19 relating to the management, control and disposal of waste, is the municipality's responsibility who organizes on its territory a public service to meet its citizens' needs in collecting, sorting, transport, valorization or disposal of garbage. Municipality may grant household and similar wastes to others but it is still responsible for its execution. So, communal assemblies of two or more municipalities may be associated to waste management. Some waste activities such as development and promotion of source reduction, collection and recycling are conducted, at a national level, by the National Waste Agency (NWA). Collected wastes are sent to the final discharge to be stored. Already, from the deposition phase, wastes are subjected to degradation processes related to biological reactions and physical-

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chemical complexes. Water gets inside and produces lixiviat (garbage juice) and biogas. Their components anthropogenic release of many toxic substances into the environment, including air, groundwater and steams (Kehila et al., 2007). A very important fact to note is that of the marginalization and the absence of the waste producer role which are households. Citizen's involvement in the management of household and similar wastes is more than a necessity: it is a duty! It is desirable to develop a citizen behavior towards wastes and garbage. It is necessary to develop topics such as waste, environment and so on at schools and universities and seek the involvement of everyone so that wastes are not thrown anywhere! Municipalities are responsible. What costs them in order to provide their cities and neighborhoods with recycling bins? What do they expect for to make it? If in Europe and in the United States and Canada the sorting has become a daily habit, in Algeria it is not yet established and it is not until 2014 that it comes into effect with the creation of sorting wastes and the setting up recycling bins. At the time of writing these lines, recycling bins do not yet exist in the country! There is only one kind of garbage (of green color) in which citizens put all sorts of rubbish. Moreover, in individual or collective housing zones no area for garbage collection is planned. The bin is dispatched across on undeveloped lots or on sidewalks cluttering paths. Its content may spill on the road by young children (and sometimes adults!) looking for anything that can be sold particularly empty bottles plastic milk. It is difficult to understand this startling fact without having seen with his eyes these kids around garbage cans! Now in certain European countries like Denmark and Sweden the trash is rare on the sidewalk. These countries have come to establish a policy ground floor where feet of buildings allow storage in technical private spaces. Waste collection is done from a private space and not from the street. In France, at Dunkirk, in urban areas and in individual housing zones, sidewalk advances of one meter wide made on the parking space (with a lowered curb) are located at least every 30 meters (98.42 ft) to facilitate the passage of bins between cars. In collective housing zones an area for collecting bins accessible from the road is laid to the right place of exit trays (National Council of Transport, 2005). Other examples are also worth noting: collection systems of waste by aspiration. Aspiration can be done by a truck or by generating an underground pneumatic transport to treatment places. The collection may be selective or not. Made by Swedes and Japanese, these systems have been developed especially in Barcelona and in Monaco at the Fontvieille's Olympic district (National Council of Transport, 2005). If bins are placed in public spaces, municipal officials do their utmost so they do not clutter public areas and that collection points are selected and restricted with: a red bin for non-recyclable waste; a yellow bin for empty plastic containers, metals, cartons recyclables; one blue bin for newspapers, books, magazines, leaflets also recyclables; a green bin for glasses (bottles, jars) recyclables. In Europe, the sorting of household wastes serves three purposes: the isolation of toxic waste, the reusing what can be recycled and the separation of biodegradable elements to decrease the volume of waste. In some European cities, each home has already for a long time a bin for wastes compostable, a one for household packaging and a one for wastes recyclables (Gauzin-Müller, 2001). But it is not enough to be satisfied by the sorting.

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Valorization of waste should be taken from the programming and project design (Gauzin-Müller, 2001). Unfortunately in Algeria, currently sorting, recycling, treatment and valorization of wastes do not generate the enthusiasm of local communities.

2. TYPOLOGY OF HOUSEHOLD AND SIMILAR WASTES

Household wastes are wastes generated by households. Similar wastes are wastes of industrial, crafts, merchants, schools, utilities, service industries and hospitals that have physical and chemical toxicities or equivalent to those of household wastes (Ouzir, 2008). Community wastes are collective sanitation wastes, green wastes of public spaces, streets cleaning residues… (see table 1). The identification of all such wastes take place in Algeria according to executive decree N° 06-104 dated on Moharram 29 th, 1427 corresponding to February 28 th, 2006 establishing the classification of wastes.

This identification is a systemic classification by assigning a code number structured as follows: the first digit represents the category that retraces the industry or the process where wastes are originated, the second represents the section that traces the origin or the nature of wastes belonging to the category and the third number represents the section that traces the designation of the waste. It indicates at the same time the affiliation to the class of household and similar waste (HSW), inert (I), special (S) and special dangerous (SD). Wastes can also be grouped according to their origin or their toxicity.

Referring to the ORS Ile-de-France's study (2007), we can say that the typology of household and similar wastes is of two kinds: non-dangerous wastes and dangerous wastes.

2.1. Non-dangerous wastes

Non-dangerous wastes are those that do not have characteristics of the danger (such as toxic, explosive, corrosive). These are household wastes (household garbage, cumbersome), wastes resulting from cleaning maintenance of public domains, wastes of public open spaces associated with the maintenance of green spaces, wastes from the public sanitation cleaning of sewerage or wastewater collected, wastes treatment activities comparable to domestic wastes (catering wastes, maintenance of green spaces, administrative…), wastes from agriculture, forestry and livestock.

Many of these wastes are liquid and can be considered as effluents. Some of them are used in place because of their richness in organic matter. In this category we can include livestock manure, crop waste and forest. There are also wastes from economic activities comparable to domestic wastes arising from shops, offices and small industries or collectives institutions (educational, cultural, military, penitentiary…) which use the same elimination circuit as household wastes. About these wastes, their management is done by the municipal services on condition they do not cause specific constraints to household wastes. Wastes

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produced by industrial, commercial and trade whose elimination is legally responsible to the company are also part of this nomenclature. Such wastes can be very diverse.

They are inert wastes consisting of excavated material and demolition debris as well as residues from industrial minerals mining and manufacturing industries of building materials and ordinary industrial wastes (OIW) made of paper, cardboard, plastic, wood, metal, glass, organic matter, plant or animal. They result from the use of packaging or manufacturing wastes or scrap.

2.2. Dangerous wastes

Dangerous wastes are any wastes with at least one of the dangerous properties: toxic, oxidizing, flammable. These are special industrial wastes (SIW), wastes of potentially infectious healthcare (WPIH: sharp wastes, pointed, cutting, bandages, anatomical specimens), wastes healthcare of risk not infectious (WHRNI: laboratory reagents, detergents, mercury thermometers, dental amalgam), household wastes such as packaging not completely empty of gas under pressure, cleaning products and crafts (paints, solvents), gardening (pesticides), waste treatment (syringes), motors oil, some batteries, fluorescent lamps, thermometers containing heavy metals. If dangerous wastes came mostly from industry, households, small and medium enterprises (SME), small and medium industries (SMI), artisans, health facilities and farms also produce in small quantities.

TABLE 1 - HOUSEHOLD AND SIMILAR WASTES (AINA, 2006)

<table>
<tr><th colspan="6">HOUSEHOLD AND SIMILAR WASTES</th></tr>
<tr><th colspan="5">HOUSEHOLD WASTES</th><th>SIMILAR WASTES</th></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td colspan="3">HOUSEHOLD WASTES (usual sense)</td><td rowspan="2"></td></tr>
<tr><td colspan="2">HOUSEHOLD WASTES (strict sense)</td><td rowspan="2"></td></tr>
<tr><td>Community Wastes
▪ Wastes of green public:
▪ Fairs and markets
▪ Clean and road mud purification
▪ Greases</td><td>Casuals wastes household
▪ Cumbersome
▪ -Gardening
▪ Single
▪ Sanitation
▪ Wastes related to use automobile
▪ Used oils</td><td>Fraction collected selectively
▪ Packaging
▪ Newspapers
▪ Magazines
▪ Household Wastes
▪ Toxic wastes in dispersed quantities (TWDQ) held by professionals.
▪ Putrescibles household wastes that can be composted: kitchen wastes, some green wastes, paper, paperboard and textiles health FFHW
=
Fermentable fraction of household wastes</td><td>Residual fraction collected in mixture
=
residual garbage household</td><td>Ordinary wastes of business and administration collected together by the public service</td><td>Ordinary wastes of business and administration not collected together by the public service
▪ Ordinary waste in mixture
▪ Mud purification
▪ Greases
▪ Used oils
▪ Debris and rubble
▪ WHRNI
▪ Wastes related to use automobile
▪ TWDQ.</td></tr>
<tr><td colspan="5">MUNICIPAL WASTES</td><td></td></tr>
</table>

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These toxic wastes produced in small quantities by a large number of holders are grouped under the generic term of toxic wastes in dispersed quantities (TWDQ) (Table 1). Because of their toxicity, the elimination of dangerous wastes is subject to special precautions in the collection, transportation and treatment. They are made in waste disposal or in devoted sectors with adequate facilities.

To encourage a collective organization management of TWDQ, SIW, WPIH and WHRNI it is necessary to create working groups including all stakeholders (SME/SMI, artisans, officials of hospitals, health centers and laboratories, waste professionals, local authorities) so they can share their skills and their technical and financial resources.

3. PRODUCTION OF HOUSEHLD AND SIMILAR WASTES

In 1990, the world production of household wastes was about one billion tons and it is growing. The amount of municipal wastes produced in Algeria is estimated at 10 millions tons per year (22040.622 millions pounds) of which about 1.5 millions tons (3306.933 millions pounds) of industrial wastes similar to household wastes. Annually, French people produce thirty millions tons of household wastes. If Algeria's production is three times lower than in France, the fact remains that the proliferation of wastes in Algerian cities is a headache for the government. Algerian cities are experiencing a real problem in garbage. According to the national report on the state of the environment in 2005, there were in 1980, a cleaning agent for every 500 people. In 2000, there was one for 1500 people. According to the same source, in 1980, there was one cleaning vehicle for 7500 inhabitants; in 2000, one vehicle for 4000 inhabitants. This situation still persists to the point where wastes are part of everyday life because no space is spared. In cities like Algiers, Oran, Constantine, Annaba, Batna, Setif, El Eulma the spectacle is unpleasant. Anarchic and wild dumps litter streets, alleys and public spaces. Garbage bags are sometimes left on intermediate levels and staircases of buildings. The lack of civic virtue did not spare places of elevators which do not function any more. With time, these ones are invaded by garbage of all kinds. At the bottom of buildings, close to commercial premises, it is always the same images available to view throughout the year. Household and similar wastes have ended up giving the appearance of Algerian cities large open dumps where nauseous odors constitute an attack against the environment and citizens. In 2005, services of the Ministry of Regional Development and Tourism (MRDT) have identified 3200 illegal dumps in the country. These discharges poorly exploited and poorly appropriate are serious threats to the environment and the public health. Indeed, the decomposition of wastes and the provision of water in the presence of air produce a lixiviat charged of organic and inorganic substances generating a type of organic, nitrogen or metal pollution. The volume can reach considerable proportions (Kehila et al., 2007). The amount of household and similar wastes is rinsing since 2002 due to changing patterns of household consumption and the gradual establishment of various branches of selective collections. In 2002, the National Action Plan for Environment and Sustainable Development (NAPESD) has

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estimated at 0,5 kg/inhabitant/day (1.1lb/inhabitant/day) the amount of household wastes. In 2010, the production increased to 0,75 kg/inhabitant/day (1.65 lb/inhabitant/day). In cities exceeding 300,000 inhabitants (including Annaba, Batna and Setif) the production is of 1 kg/inhabitant/day (2.2 lbs/inhabitant/day). In cities of over 100,000 inhabitants (including El Eulma, Saida, Tizi Ouzou, Laghouat, Jijel) it is of 0,5 kg/inhabitant/day (1.1lb/inhabitant/day). However, the production reached 0,75 (1.65) for El Eulma's city. This increase is due to the implementation of "Charaa Dubai" a bazaar with more than 2500 shops which never ceases to grow up and to develop. Traders, wholesalers and retailers from different cities of Algeria are supplying various products: electrical, telephone, computer, electronic components, furniture, hardware, toys, dishes, clothing… Garbage left around commercial spaces after work is exorbitant. It is of 25 to 37,5 tons per day (55115.59 to 82673.325 pounds). In cities exceeding 1 million inhabitants (including the capital Algiers and Oran) the amount of household and similar wastes is highly variable depending on the population density but also based on the lifestyle of individuals, their occupational status, types of habitat and their places of residence. In general, they are composed of putrescible wastes (green wastes, food wastes…), particulate matters (dusts, ashes), broken glasses, various packaging (cardboards, plastics, metals), textiles (clothing, rags). With changing consumption patterns, packaging materials (papers, cardboards and plastics) are assuming an increasingly important waste mainly in the cities mentioned above.

4. NATIONAL PROGRAM OF MUNICIPAL WASTES INTEGRATED MANAGEMENT (NPMWIM): A PROGRAM TO FURTHER IMPROVE AND TO FULLY IMPLEMENT

Wastes management is one of Algerian society's flaws. State is aware of this problem and has established the National Program of Municipal Wastes Integrated Management (NPMWIM). Developed by the Ministry of Land Planning and Environment (MPLPE), this program aims to eradicate the practice of illegal dumps, to organize the collection, the transportation and the elimination of municipal solid wastes under conditions that ensure the protection of the environment and the preservation of environmental health by conducting, development and equipping centers of technical burying (CTB) in all wilayas (states). It is characterized by the development, in close collaboration with local authorities and communities and by master plans for integrated management and wastes treatment. It sets up an integrated planning of municipal wastes management. Significant financing are in place: 18 billions dinars (193 millions €) are devoted to the sector and special wastes under the Five Plan of Support for Economic Growth (FPSEG) 2005-2009. This sector will have, within the next year program (2010-2014), at least the same budget. Mobilized funds have allowed to initiate studies of many master plans of wilayas (states) and communal management of household and similar wastes, centers of technical burying class two (household wastes) and class three (inert wastes), implementation of waste disposal and sorting centers, exploitation means of infrastructures, means of collecting and transporting wastes. Eight hundred and fifty-six (856) master plans of municipal management's

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household and similar wastes have been developed with six hundred and twenty-one (621) are completed and the construction of ninety-seven (97) centers of technical burying (CTB) that receive household wastes to put them into pits called "hiding bins". Since 2005, when starting the project, thirty-two (32) CTB was completed, forty-nine (49) are under construction and sixteen (16) are under study. For smaller cities, one hundred and two (102) small controlled dumps were planned, eighteen (18) have been completed to date, fifty-seven (57) are under construction and twenty-seven (27) are still in study phase. By 2014, three hundred (300) sorting centers and forty-one (41) waste disposal centers should be created. According to a ministry source, the national rehabilitation's implementation of waste sites has reached significant saturation point in seven (7) wilayas (states) (MLPE, 2003). The first phase concerns the study of the closure and the rehabilitation of dumps in Algiers (Oued Smar), Annaba, Skikda, El Taref, Tebessa, Djelfa and Tiaret on a total of twenty (20) planned dumps. In Algier's wilayas (state) it is Oued Smar's dump which is pointed because it knows an average of four hundred and forty (440) dumps operations per day including two hundred and twenty (220) operations of household wastes. Oued Smar's dump in existence since 1978 should be closed in 2008 and rehabilitated in a park of 40 hectares (98.84 acres). It should be completely destroyed by a Turkish company. Dump's works of closing and redevelopment had to be made known by the company Yapi System Turkey to over 6,5 billions dinars (65 millions €). The Minister of Land Planning and Environmental had officially announced the award of the project at this society. Unfortunately, the site collapses always under wastes and the project still lingers and even worse because monticules of wastes are now reaching a height of 62 meters (203.412 feet). With regard to the collection and management of household wastes, it is provided in each wilayas (state) and Industrial and Commercial Public Establishment (ICPE) under the supervision of the prefecture's direction environment in charge of this mission. The ICPE NETCOM for Algiers' wilayas (state), for example, founded in 1996 manages twenty eight (28) of the fifty seven (57) communes that make up the wilaya. It has three hundred and twenty (320) vehicles for collection and cleaning that throw in dumps 2000 tons of wastes per day (4,409.244 pounds per day). But ICPE is considered as a transitional form before recourse to other forms of management (joint management or managed services) that State is planning to consider. However legal institutional points as well as investment aspects of the program need to be improved. The points remain: implementation of regulatory and legislative texts relating to wastes rigorously and effectively, implementation of training plans and awareness of environmental education and especially of garbage problem, development of household and similar wastes' guidelines or manuals providing technical recommendations to disencumber sidewalks and undeveloped lots of trash and garbage, capacity building of waste management and rehabilitation of municipal services to new techniques and methods, integration, of private sector in management, partnership… The investment must also affect the sorting centers and the treatment of the lixiviat. The program should highlight storage centers operated in bioreactors. These are storage centers where one accelerates the degradation of the material organic cellulose to produce methane. They may render a huge service to our country. If on the 10 millions

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tons per year of wastes produced in Algeria, 760.000 tons (1675.512 millions pounds) are collected according to the National Waste Agency (NWA) in the form of paper, plastic, glass, various materials…, it is reasonable to ask what would become of the remaining 9.240.000 tons (20365.110 millions pounds) stored and not used. When we know that one ton (2204.622 pounds) of stored household wastes produces an average of 100 m3 of methane which is the equivalent of 100 liters (26.45 gallons) of essence, a rapid calculation gives us 924 millions m3 of methane, the equivalent of 924.000 m3 of essence (24.334 millions gallons), that is to say 924.000 trucks of 10 m3 of essence are lost every year! If recycling of materials is being developed and is an integral part of the Ministry of Land Planning and Environment's (MLPE) priority program, this one has calculated, however, a loss of income of 3.5 billions dinars per year, that is to say 0.13 % of GNP (Gross National Product). This amount is lost annually in dumps.

5. DUMPS: AN OBVIOUS RISK FOR THE CITIZEN'S HEALTH AND THE WHOLE ENVIRONMENT

Household wastes absorb water which penetrates into the dump. Their capacity of retention is situated between 0.4 and 0.7 L/kg (gal/lb) of raw (gross) household wastes. The volume of meteoric precipitation can evaluated using meteorological data. A study of several mixed dumps (domestic and industrial wastes) showed that the evapotranspiration represents an average of 75 % of the real pluviometry (Barres et al., 1990). The volume of runoff water depends on the watershed, rainfalls, the existence and the effectiveness of diversion's devices of waters outside the site. A study of the former National Agency for Recycling wastes (NARW) conducted from 1983 to 1985 showed that the average amount of lixiviats collected in technical conditions of the time was of 1500 m3/ha/year (21448.178 ft3/acre/year) (Barres et al., 1990). This corresponds to 25 % of pluviometry P, a theoretical ratio of P/4 (Emille, 2008). Household and similar wastes are simply stored, in our country, in centers of technical burying (CTB). If the storage of wastes in dumps, outside living spaces, is the mode of the least expensive and the most wide-spread treatment (Thonart et al., 1998), the fact remains that these last ones generate nauseous smells and raise a real problem of insertion of processing centers in their human environment. The pouring of wastes and the process of aerobic fermentation are potential sources of olfactory nuisances on the site and its neighborhood. These olfactory nuisances have a considerable importance in the perception of health risks associated with the situation to "feel exposed" with possible repercussions of disorders (confusions) identical to those observed in people under stress namely mental disorders (depression, aggression) and somatic problems (sore throat, nausea…) (Renault et al., 2006). Dumps also disrupt the natural environment and cause problems of pollution of soils and waters (Rinke, 1999). This is the case for example of Ouled Fayet's in Algiers and El Outaya's in Biskra centers of technical burying which have enormous problems at the level of lixiviats' drainage. These collected last ones are not treated but rejected directly in the nature. Ouled Fayet's center of

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technical burying (opened in 2001, situated in 15 km (9.315 miles) in Algiers' southwest) covers about 40 hectares (98.80 acres) of surface including 20 (49.40) for the burying, as for that of El Outaya (opened in 2008, situated at the city's north in 10 km (6.21 miles) of downtown's Biskra) which covers a 32,97 hectares (81.435 acres) of surface. Both centers cover together a surface of approximately 73 hectares (180.31 acres) and their volume debit of lixiviats raw products by unity of surface is very important. When we know the volume debit of lixiviats raw products by unity of surface can reach 177 m3/ha/month (2530.598/ft3/acre/month) (Emille, 2008) the debit of both centers is then 12921 m3 (456292.190 ft3) enough to fill 1292 tank trucks of 10 m3 (353.146 ft3). What then of illegal dumps' surface area reported by the Ministry of Land Planning and Environment (MLPE)? Without considering small uncontrolled dump sites (not declared by the MLPE) which grow daily and are scattered on lost spaces or on undeveloped sites. We have listed, for the only 2008/2009, several in the following cities: forty seven (47) in Algiers, more than forty five (45) in each of coastal cities like Oran, Bejaia, Jijel, Skikda and Annaba, forty two (42) in Constantine, forty (40) in Setif and around thirty (30) in each of cities as El Eulma, M'Sila and Bordj Bou Arreridj. Each ones of these small illegal dumps are characterized by a surface area of about 20 m2 = 5 m x 4 m (83.968 sq ft = 6.4 ft x 13.12 ft). They are located far from glances. Garbage is usually wrapped in plastic bags. When we know the plastic bag is not biodegradable, we can say that small illegal dump sites are in the nature to last. The 3200 uncontrolled dump sites declared by the MLPE occupy a surface area of more than 150000 hectares (370650 acres) among the most fertile lands and have no waterproofing system, nor protection, drainage-geo membrane and geotextile and nor network capture processing of biogas and of lixiviat. A small calculation of their debit of lixiviats raw products by unity of surface gives us 26,55 millions of m3 (937.758 millions of ft3). Enough to fill 2655000 tank trucks of 10 m3 (353.146 ft3). And every month these millions of m3 (ft3) of lixiviats are poured in nature without any treatment causing pollution problems of soils and waters which are of three types: pollution by organic and mineral matters, pollution by heavy metals and pollution by microorganisms (Kehila et al., 2007). The pollution by organic and mineral matters is engendered because an organic part related to wastes age as well as a mineral fraction of lixiviats essentially constituted by chlorides, sulfates, bicarbonates, potassium, sodium and ammonium can meet in underground and surface waters when minimal conditions of wastes burying are not respected (Kehila et al., 2007). Lixiviats have strong heavy metals contents and can also engender pollution. Aina's study (2006) on Ouled Fayet's site in Algiers shows their concentration in cadmium, copper, nickel, lead, zinc and mercury. Cadmium is generated by accumulators but also by plastics, glasses (coloring agents) and metals (alloys). Copper can be generated within the massif by electric cables and metals but also by textiles and plastics. Nickel arises from metals (alloy- nickel), accumulators (nickel- cadmium) but also by textiles and glasses. Lead is provided by batteries, lead shot and paintings. Zinc is often generated within massifs of wastes by piles, cans but also by plastics, glasses, paintings, textiles… Mercury is due to the presence of thermometers but equally of piles as well as of dental amalgams and lamps (Aina, 2006). These heavy metals bring into sets phenomena such as:

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solubilization at acidic pH, complication by the organic matter of humic type, precipitation at basic pH, retention of suspended solids on soil particles, adsorption of ions or molecules on the surface of grains porous matrix, exchanges and so on (Lagier, 2000). Pollution by microorganisms also generates negative effects. The bacterial staff in the raw lixiviat is between 0.04 x 106 and 0.34 x 106 bacteria / ml and the biomass varies between 8.78 and 77.51 µg C/L. Many waterborne diseases are caused by the consumption of waters infected by lixiviats. The most known are salmonellosis (salmonella), cholera, shigellosis (Kehila et al., 2007).

6. CONCLUSIONS AND REOMMENDATIONS

Algeria is therefore privileging centers of technical burying (CTB) as a solution for the management of household and similar wastes. Now, when we know that centers of technical burying (CTB) just built are already outdated and quickly problems are emerging: such as leakage of lixiviats, groundwater contamination, inadequate processing methods to the type of wastes and so on, we are wondering why public authorities do not look for other alternatives. When we know, according to the Ministry of Land Planning and Environment (MLPE, 2003), that 70 % of the Algerian trash can content is an organic origin, it is reasonable to ask why the composting choice is not an alternative. This choice does not seem to please to MLPE officials under pretext that the compost is not recoverable (reusable). On this matter, Gauzin-Müller (2001) is very explicit: wastes can be valued under three forms:

- organic valorization for composting or methanation for green wastes (leaves, grasses, flowers and small wood chips). Compost can be used as a fertilizer and methane as an energy source;
- valorization of materials for papers, cardboards, glasses and metals which are recycled in the manufacturing process or reclaimed for use;
- energy recovery for all types of wastes burned in an incineration plant where energy can be recovered.

We can obtain biogas useful for housing. Biogas can replace town gas and feed domestic appliances which consume most energy. Compost valorization can thus be of agronomic types such as organic matter in the ground (humus notion), agricultural contributions… or of not agronomic types such as energy, animal and environmental valorizations. The environmental valorization corresponds to the implementation of filters with compost: humic macromolecules mature composts have indeed a strong adsorbent power and this property will be utilized in certain systems gaseous or liquid effluents' treatment. This system of active filter can thus be used as a filtration system for odors in a sewage treatment plant or a treatment station of household wastes. The value of mature compost as a medium adsorbent is threefold: it is available locally in large quantities at marginal cost; it acts very effectively on the retention of malodorous and toxic organic

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compounds and especially it regenerates itself automatically with the activity of micro-organisms that break down these compounds. Furthermore if treated molecules may not be toxic, the compost will be marketable (Devisscher, 1997).

Municipal officials are obliged to provide more technical solutions of existing centers of technical burying (CTB) and create lixiviat treatment units. They are also responsible to organize themselves territorially in order to close all existing illegal dumps and to prohibit new ones, to set up collection services more efficient, to optimize household wastes, to lead researches in close collaboration with universities and laboratories, to develop existing and new sectors of "sorting, recycling, treatment and valorization", to face the fast evolution of the society and the waste which it produces because new sectors as well as their management meet several issues:

- local issues: managing land use, pollution control and environmental quality, controlling health risks, nuisance control (noise, odor, road traffic…);
- global issues: contributing to the reduction of greenhouse effect, savings of raw materials, reduced energy consumption by reducing transports and by improving the performance of energy valorization and the optimization of material recovery;
- financial issues for communities and companies and finally a social issue with jobs creation.

REFERENCES

Aina, M.P. (2006). *Centers of technical burying of urban wastes' expertise in developing countries: a contribution to the development of a methodological guide and its experimental validation on sites*, doctoral thesis No. 46 , Limoges' university, Graduate School Science-Technology-Health, Faculty of Science and Technology, Laboratory Sciences water and Environment, discipline Chemistry and Microbiology of water, p.139.

Barres et al. (1990). Dumps' lixiviats. The point of knowledge in 1990. *TSM-L'eau*, 85 (6), pp. 289-313

Devisscher, S. (1997). *The compost*, D.E.S.S Memory, Picardie's university.

Emille, B. (2008). *Lixiviats household wastes' evolution of the environmental impact on superficial and subterranean waters, hydro biological and hydro geologic approach*. Site of study: Etueffont's dump (Belfort's territory - France), doctoral thesis, of Franche-Comté's university, UFR of the Sciences and Techniques, school doctoral Man Environment Health, p. 76

Gauzin-Müller, D. (2001). *L'Architecture Ecologique*, éditions Le Moniteur, Paris.

Kehila, Y. et al. (2007). *What perspectives for the technical burying and the eco-compatible storage of the solid residues in the PED towards impacts on the urban hydrosphere?* JSIRAUF's acts, Hanoi.

Lagier (2000). *Lixiviat macro molecules' study: characterization and behavior towards metals*. Doctoral thesis. Limoges' university.

MLPE (2003). *Ministry of Land Planning and Environment*, Manuel of information about the management and the elimination of urban solid wastes - Algiers

ISSN
2067- 2462

National Council of Transport, (2005). A road for all, Safety and cohabitation on the road beyond conflicts of use, Tome1: Report of the Reflection Group chaired by Hubert Combs, General Council of Civil Engineering, attended by Jean-Charles POUTCHY-Tixier, *National Council of Transport*, pp. 124-125.

Ouzir, M. (2008). Gestion Ecologique des Déchets Solides Industriels. Cas d'étude la ville d'Arzew (Algérie). Mémoire présenté pour l'obtention du diplôme de magistère. Spécialité : Gestion des Techniques Urbaines. Option : Gestion Ecologique de l'Environnement Urbain, Université de M'Sila. Institut de Gestion des Techniques Urbaines.

Renault, C. et al. (2006). Guide méthodologique pour l'évaluation du risque sanitaire de l'étude d'impact des installations de compostage soumises à autorisation, Association Scientifique et Technique pour l'Eau et l''Environnement (ASTEE).

Rinke, M. (1999). Migration of mineral pollution in soils under wastes' dumps: case study. Doctoral thesis, Limoges' university.

Thonart, P. et al. (1998). La gestion biologique d'une décharge. Tribune de l'eau 1998, n° 590/591, pp. 3-12.

ISSN
2067- 2462