

## *Waste Disposal Issues in a Philippine Upland Urban Center*

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### **Abstract**

Unsustainable human behavior and practices in relation to waste disposal invariably result to environmental degradation. Issues on these add to the ever-growing myriad of concerns and problems that beset highly urbanized centers all over the world. Previous and more recent studies on waste disposal in Baguio, an upland highly urbanized city in northern Philippines, indicate that the same problems still haunt this metropolis.

The city's fast-growing population and the unabated in-migration of people from the lowlands and from adjacent mountain provinces contribute to an infinitely increasing volume of waste generation, more rampant use of plastic materials and on the overall, the worsening garbage problem of the city. Poor solid waste management, inefficient technological solutions and measures put in place by the local government unit have failed to address the city's waste disposal issues. A more pressing problem, however, is the resultant pollution of creeks, streams and river systems that flow into low-lying areas and how this has affected the water supply and the health of the residents of the localities. Various non-government organizations and people's organizations have joined forces to promote activities that will educate and foster the involvement of the residents on the waste disposal issues currently plaguing Baguio City.

Discussion of the above will be based from a study of the city's garbage in the early '80's, a research in the mid '90's on the socio-economic and environmental impacts of the then Baguio City's open dumpsite in Irisan, a survey among students in a premier Baguio City university on waste segregation in 2012 and current fact sheets from the local government unit and non-government organizations concerned with the city's waste disposal issues.

Keywords: environment, waste disposal, pollution, Baguio City

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## Introduction

Baguio City is a highly urbanized center in upland northern Philippines. Known for its temperate climate and pine forests and designated in the 1900s as the summer capital of the country, the city has developed into a hub of commercial trading, education, industry, regional administration, and tourism. But unlike other sprawling metropolis, its land area is only 57 sq km with a population of more than 367,000 as of 2016 according to the latest National Statistics Office survey (Barangay-Population-CAR-2011-2016.). Unofficial figures put its population at over 400,000 with some 5,000 people added to the city's population every year surpassing the national average population growth rate but which is mainly attributed to migration rather than birth rate according to the Population Commission (Pop-Com). Baguio has been cited as having one of the highest population densities in the country. Its regular daytime population of approximately 400,000 is known to double or triple during Holy Week and Christmas vacations, two of the country's most-observed holidays.

Located 250 km north of Manila, the city is nestled on a plateau at an elevation of 1300 to 1600 meters asl (Fig. I).



**Fig. I.** Location map of Baguio City

According to the 2002-2008 Baguio Comprehensive Land Use Plan (CLUP), the city's terrain has a slope grade of 19-36% with most of the area being of undulating to moderately steep slope, Residential land use takes up 61.00 % of the city's land area followed by vacant forested area (12/38%), commercial area (2.57%) and forest/watershed reserves (2.54%).

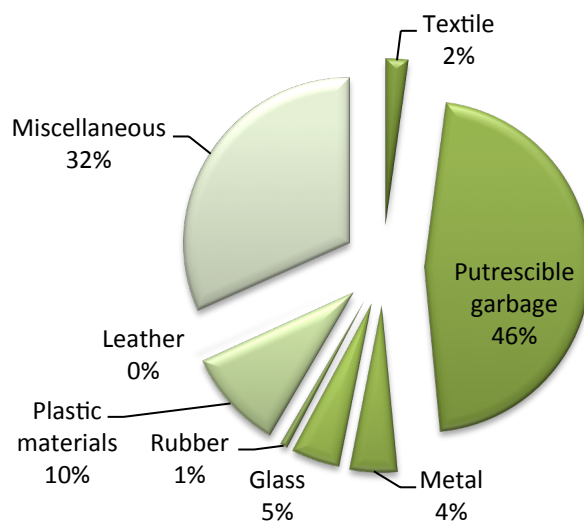
In view of its very limited land area and the unabated influx of settlers, Baguio is beset with problems that include but are not limited to waste management. As of 2012, data show that the city generated 355 tons of solid waste materials per day or 130,000 tons for the year. Many of its residents are worried about the health of the city's urban ecosystem and the seemingly uncontrolled development in the city.

These have been expressed in numerous studies and researches involving this metropolis.

### Solid Waste Disposal in the Early '80s

A study of Baguio City's waste situation and refuse management measures that were in place was undertaken in the early '80's concurrent with that of nearby La Trinidad (Macaranas, E., 1985). The main concerns then were public health impact, environmental protection, aesthetics and resource recycling. Health issues centered on the spread of parasites, increasing incidence of diarrhea, hepatitis and gastro-enteritis whereas damage to drainage, dumping of refuse in sidewalks and open canals and degradation of water quality were frequently mentioned as reasons behind the deteriorating environmental condition of the city,

The report indicated that the city's population as of 1984 was merely 133,726 with students making up approximately 30,000 of the said figure. The solid wastes collected per day from the city's municipal garbage averaged 145 m<sup>3</sup> with 128 m<sup>3</sup> being contributed by residential areas and the remaining 17 m<sup>3</sup> by institutional/commercial establishments. The solid wastes that were sampled over a period of ten days consisted mainly of putrescible garbage or what more modern terms would designate as biodegradable refuse (**Fig. 2**).



**Fig. 2** Physical Composition of Solid Wastes of Baguio City\*  
*based on data obtained over a 10-day period of collecting garbage in 150 households*

Analyses of refuse obtained from the samples included measurements of solid waste generation rate, bulk densities, size analysis using 25 mm mesh, physical composition with the results utilized to arrive at improvements on existing waste management systems and possible measures to address the worsening problem on waste generation and disposal.

Results of the chemical composition analysis of putrescibles segregated based on source, namely residential and commercial sectors, yielded a C/N ratio ranging from 16.93 to 23.71 for samples obtained from three densely populated localities and an

average of 9.55 for the commercial sector. The C//N ratios obtained were, however, lower than the optimal requirement for composting suggesting that composting will not be a practical solution at the city level but it can be practiced by households in their respective backyards instead of burning or using open dumps for the disposal of putrescibles.

Garbage collected along a sidewalk in the city market that consisted mainly of agricultural trash showed the following composition (averaged over a period of ten days of sampling): Chinese pechay – 40.22%, peas – 20.15%, strawberries – 13.70%, weeds – 10.82%, 14.11%. and plant residue. Rotting garbage thrown indiscriminately along the sidewalks was established as a major water pollutant as they leach into ground waters or join surface run-offs during the rainy months.

From a socio-political perspective, the study's assessment of the local government unit (LGU)'s fulfillment of its mandate to decide on ordinances involving garbage fees & the authorization to collect such fees, implement and impose existing laws and decrees regarding pollution is that of a passing mark, Two of the reasons put forward were the government's provision of garbage pick-up trucks and the financial support given to localities that needed help in the improvement of their SWM. The study clearly pointed out, however, that a review of the organizational structure of the city's Division of Sanitation and of the functions of each personnel should be a top priority in view of the unabated in-migration leading to a rapidly increasing population and the fast developments that the city have been experiencing. It likewise suggested increasing the number of garbage pick-up trucks, educating the residents on waste segregation and composting and prescribed the use of a sanitary landfill. The study also strongly suggested that the private sector and the LGU will have to work cooperatively to tackle problems on waste disposal and management.

### **Environmental and Socio-Economic Impact of the Irisan Dumpsite**

Health concerns particularly from methane-emitting, degrading waste encouraged a similar study a decade later. But this time the research was focused on an area in barangay Irisan where approximately 150,000 kilos of waste 60% of which is spoiled vegetables are thrown daily and served as the sole open dumpsite of the city (**Fig. 3**).



**Fig. 3.** Irian dumpsite *circa* 1990's

The study was an attempt to gather concrete data on the effects of the dumpsite to the water supply of low-lying communities particularly the locality of barangay Asin whose residents draw their water from a cave or tunnel located directly below the dumpsite (Giron, O., 1995). The parameters that were measured over a six-month period to establish the physico-chemical characteristics of water samples from the cave were pH, temperature, dissolved oxygen (DO), biochemical oxygen demand (BOD), total coliform organisms, and residual chlorine. Except for temperature and residual chlorine, all the parameters that were monitored constitute the minimum water quality parameters for the classification and reclassification of a water body according to a particular designated use or uses as mandated by Administrative Order No. 34, Series of 1990 of the Department of Natural Resources and Environment (DENR). The measurements obtained were definitive to the classification of the water as Class A or Public Water Supply Class II. According to the National Standards for Drinking Water (NSDW) of the Philippines, this classification is for sources of water supply that will require complete treatment (coagulation, sedimentation, filtration and disinfection). High levels of bacterial contamination particularly organisms of fecal origin like *E. coli* coupled with very low DO concentrations all point to high organic pollution that one may deduce as due to the decaying wastes from the dumpsite.

To determine the economic benefits that the residents were gaining from the dumpsite, a survey of randomly selected 48 households (21% of households in puroks that comprise the dumpsite) was carried out. The results confirmed economic benefits as 40 households were engaged in scavenging out of which 80% indicated scavenging as the main source of family income. The reported monthly earnings from the activity ranged from as high as P5000.00 to not lower than P400.00. Random interviews revealed that women and children pitched in for additional income, and as a result, the children are deprived of basic education, health care and play.

Table 1 enumerates the health and other concerns of 48 respondents randomly selected from the four *puroks* that comprise the dumpsite. The respondents were most concerned with health issues which were mainly respiratory diseases and the proliferation of flies, rodents and cockroaches. Ironically, the survey results on main concerns ruled out the relocation of the dumpsite to another area. Most of the respondents put more consideration on the LGU's adoption of proper waste management and the delivery of basic necessities particularly potable water than on problems attendant to the dumpsite itself.

**Table 1.** Health and Other Concerns of Irisan Residents

Health Concerns	# of Respondents
Respiratory diseases	44
Gastro-intestinal diseases	12
Proliferation of flies, rodents & cockroaches	28
Others (fever, headache, body malaise)	5
Other Concerns	# of Respondents
Sufficient protection gear for dumpsite “workers”	33
Dumpsite may stay but city should adopt proper waste management	35
Provision of incinerator	20
Inadequate water supply	30
Relocation of dumpsite to another area	8
Setting up of cooperative among those whose livelihood depends on the dumpsite	2
Mandatory recycling among city residents	10
Smoke from burning garbage	3
Lack of electricity	3
Lack of money to resettle in other areas	3
Lack of community clinic	3
Undisciplined garbage truck drivers	1
Water purifier	1

A move to convert the dumpsite from open to a controlled one came about in 2006 (City Ordinance No. 17, Series of 2006) but this never materialized due to lack of implementation by the city government. The closure of the dumpsite came about fortuitously as a result of trash slide that happened below the dumpsite where the retaining wall of its lower part collapsed due to the rains caused by Typhoon Mina in August 2011. The tragedy claimed 6 lives, including a 10-year-old boy. Only a small area in one of the *puroks* of Irisan has been left open as staging area where recyclables can be retrieved from the collected trash before the dump trucks transport them to landfills in the lowlands.

### Survey on Waste Segregation

Another ordinance in 2006 (Comprehensive Solid Waste Management Ordinance of the City of Baguio, City Ordinance No. 16) mandated 3 type segregation of solid wastes in view of the proliferation of and increasing use of plastic materials. The city government likewise promulgated City Ordinance No. 26 in 2007 that sought to ban the use of plastic bags in the city. The LGU put more teeth into CO No. 16 and mandated waste segregation in households as one measure to curb excessive waste disposal after the tragic landslide that resulted to the closure of the Irisan dumpsite. In 2013, an informal survey on the question of awareness of waste segregation schemes was conducted involving 231 students from a population of approximately 2000 who were enrolled in a premier university of Baguio City. The results revealed that 30.7% of the respondents had no knowledge of the mandated waste segregation (Giron, O., 2013). A closer scrutiny of the types of dwellings where the students reside showed that 7 out of 10 are staying in boarding houses and are totally dependent on their landlords/ladies for information whereas only 1 out of 10 resides in student

dormitories where information dissemination is more systematic and a stricter implementation of the scheme is expected. On the question of how are plastic wastes disposed of, only 10% of the respondents practice recycling and selling to junk shops as a disposal method.

### **Current Programs and Alternative Solutions**

Cause-oriented groups and citizens composed of Baguio old-timers, the religious sector, the young and old, students and professionals, the urban poor, the activists and environmentalists have incessantly expressed their waste disposal and management concerns through the media, through statements, through rallies and mass actions. One group that is into proper waste disposal is the Baguio Vermi Growers or BVG that was organized in 2009. The members of the BVG practice vermiculture or the process of raising African night crawler earthworms that are known to facilitate the fast decomposition of solid wastes such as vegetable and fruit peelings and even paper. The BVG members harvest the organic material that is produced to be marketed as organic fertilizers. Vermiculture has been cited as one of the workable solutions to at least 40 percent of the city's daily 200 tons of wastes.

Tebtebba, a non-government organization that promotes indigenous knowledge and rights, particularly through its Traditional Knowledge Network, helped organize and is currently providing support to the BVG by conducting forums and workshops on vermiculture.

Another cause-oriented group, the *Baguio Citizens No Waste Initiative*, was formally organized in 2012 with the primary aim of building citizen participation in waste management policy and development and programs and unequivocally expressed in a statement its belief that citizens' participation is a necessary ingredient for successful and sustainable waste management in the city. The BCNWI has evolved into subgroups such as the *No to Plastic Wastes* cluster whose volunteer members are involved in various activities, information dissemination and educational campaign on the deleterious effects of plastic use. The *No to Plastic Wastes* members have also been rallying for the implementation of 2007 CO No. 26 as commercial establishments and market merchants have not been required to use non-plastic bags and packaging materials up to the present.

The Baguio City LGU has maintained that it has adopted a stricter implementation of the waste segregation plan. It also announced that the city has acquired two Environmental Recycling System (ERS) machines, each at a price of P64 million, to address the garbage issue with the ERS machines expected to manage biodegradable waste by converting it to organic fertilizer. The purchase of the ERS machines was based on an agreement between the city and an ERS provider wherein the latter would take charge of collecting the solid waste from the City's barangays and hauling the residuals to Engineered Sanitary Landfills (ESL) in the lowlands. Reports indicate that in 2014 the city generated 366 tons of solid waste per day, 122 tons were hauled out, 30 tons processed by the ERS, and 214 tons classified as recyclables and taken by waste pickers. Currently, the ERS machines are known to only able to reduce the volume of garbage by a measly 15% leaving the city faced with issues and problems on the remaining trash.

The Department of Interior and Local Government (DILG), as part of its assessment of the environmental governance of LGUs, has advised the city to shape up in urban ecosystems management and put to task the city particularly in the areas of pollution control and proper solid waste management. The DILG thus suggested the following actions for the city to undertake: (1) strengthen the Solid Waste Management Board; (2) prepare, if none has been formulated, or improve the quality of, the Solid Waste Management Plan; (3) ensure that every barangay has a material recovery facility; and (4) improve solid waste collection practices.

Based on the DILG's recommendations, the city government is pursuing an Integrated Solid Waste Management Plan (ISWMP) and started discussions on these as early as 2015. One of the strategies named in the ISWMP is the construction of an ESL to address the city's waste problem. The ISWMP also cites other strategies intended for long-term management of the city's wastes among which is a waste-to-energy technology, a central material recovery facility, anaerobic digester and health care waste treatment facility and the ERS machines.

### **Conclusion**

Much has still to be undertaken to abate if not totally eradicate Baguio City's waste disposal and management problems. Based on the above discussion, the following recommendations might help the LGU:

1. Strictly implement all city ordinances related to waste disposal.
2. Increase LGU-citizens engagement in policy-making, plan of actions and activities involving waste disposal and management.
3. Give due recognition, consideration and support to local initiatives to make them more sustainable.
4. Encourage educational campaigns, information dissemination, advocacies and research in all sectors – government, non-government and people's organizations.



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