Environmental Management Program

5

CHAPTER 5: Solid Waste

The Environment Sector has five (5) areas of concern – Solid Waste, Air Quality, Water Quality, Parks and Open Spaces and Biodiversity.

5.1 SOLID WASTE

5.1.1 Domestic Solid Waste

Generation

Latest data from the Metropolitan Manila Development Authority (MMDA) showed that Quezon City, with its high concentration of social and economic activities and it being the most populous in the National Capital Region, produces the largest volume of garbage daily. In the Waste Analysis and Characterization Study (WACS) conducted by the QC Environmental Protection and Waste Management Department (EPWMD) in 2003, each person in the City produced 0.66 kg of solid waste each day.

Another WACS was conducted by the same Office in 2013 which showed that waste generation has increased to 0.88 kg/capita/day.The same study also indicated that every year, per capita waste generation increases by 3.33%. Thus, it may be concluded that for CY 2016, 2017 and 2018, the city's per capita waste generation are 9.709 kg., 1.0032 kg and 1.0366 kg., respectively.

From the 2013 WACS and estimates based on corresponding projected population and per capita waste generation, the city produced about 3,169,220 kg. of solid waste everyday in 2018, mostly coming from residential use. Apart from which, other waste sources contribute largely enough for Quezon City's waste generation. Refer to *Table En-1* below.

Table En- 1: **Other Waste Sources; 2015-2017**

Main Activity	2015	2016	2017
Manufacturer/Producer/Repacker	1,056	1,026	1,028
Wholesaler	6,270	6,724	7,216
Exporter	85	88	79
Retailer	16,348	16,488	16,905
Contractor	19,459	20,255	21,325
Financial Institutions (Banks, Pawnshops, Insurance, Security& Stocks Dealers)	2,772	2,924	3,164
Franchise Holder	10	9	9
Restaurant and Eating Establishment	3,000	3,364	3,428
Proprietor, Lessor and Operator Hotels/Motels/Inns/Pension/Boarding and Other Lodging Houses	6,901	7,180	7,431
Amusement Center, Establishment, Bars, Cocktail Lounge, Gaming Activities and Social Recreation	441	459	526
Proprietor, Lessor and Operators Shopping Center and Private Markets	46	50	57
Importer	1,262	1,228	1,278
Learning Institution	575	579	579
Other Business and Business with Fix Rates	4,448	4,621	4,872
Multiple Activity	4,417	4,202	4,421
Unknown Activity	6	7	11
TOTAL	**67,096**	**69,204**	**72,329**

Source: EPWMD using BPLO and ITDO data

Waste Composition

Based on the 2013 WACS, biodegradable wastes account for 53.95% of total waste generated while 20.30%, 18.75% and 7% belong to recyclables, residuals, and special wastes, respectively.*(Refer to Table En-2)*

Table En- 2: **Solid Waste Composition; Quezon City: 2013**

Type of Waste	2013
Biodegradables	**53.95 %**
Food/Kitchen Waste	43.17 %
Yard/Garden Waste	9.43 %
Others	1.35 %
Recyclables	**20.30 %**
Plastic	*9.64 %*
Paper	*8.65 %*
Glass/Bottle	*1.15 %*
Metals	*0.86 %*
Residuals	**18.75 %**
Special Wastes	**7.00%**

Source: EPWMD

Collection

The City is implementing a Macro and Micro Cell-Based Collection System, wherein the waste generation of an area or a cell is equivalent to one truckload of garbage or 16 cubic meters of waste. The system of collection was established primaril to gauge the required number of vehicles needed to collect the daily waste generation of Quezon City, assign proper coding of the service areas and administer proper scheduling of waste collection. It also is being used as basis for the Package Clean-up Collection System wherein private contractors were given the full responsibility to administer and directly carry out in their specific assigned area the actual collection, cleaning and disposal of solid wastes from different sources. They are also responsible for street sweeping activities, cleaning and clearing operations as well as enforcement of environmental laws and information dissemination.

In terms of collection schedule, the city has three service schedules:

- Main Thoroughfares – collection of garbage is done daily from 4:00 AM to 7:00AM, with mopping-up operations not later than 9:00 AM and 2:00 PM. Mopping of follow-up collection are undertaken to collect late and untimely disposals. The main throughfare areas are of mixed sectors, composed mostly of commercial establishments, some industries and residential houses.
- Stationary collection – route for public markets and hospitals (domestic wastes only. Collection is done on a daily basis. For government-owned institutions, collection of waste depends on waste colume. Collection is done on a daily, twice or thrice weekly basis.
- Barangay (residential) collection – scheduled twice a week, Mondays & Thrusdays, Tuesday and Fridays, and Wednesday and Saturdays. The Barangay areas are composed mostly of residential houses mixed with some other sectors like commercial and industrial, etc.

Segreagated collection of waste is a regular practice in the city, being done in some barangays especially those practicing good solid waste management in coordination with the City. Some residential areas are also practicing waste segregation at surce in view of the proliferation of junkshops buying recycalbe materials. Some of the barangays deploy their own garbage trucks in collecting household wastes from selected pilot areas within their jurisdiction.

These components ensure the overall upkeep of the City. *Table En-3* shows volume of solid waste collected and number of trips administered for the upkeep of assigned service area.

Table En- 3: **Volume of Solid Waste Collected (cu.m.) and Number of Trips; Quezon City: 2016-2018**

Type of Collection	2016	2017	2018
Volume of Solid Waste Collected (cu.m.)	2,343,787	1,832,689	1,628,554
Number of Trips	193,501	134,509	78,380

Source: EPWMD

During the period of 2016-2018 the volume of solid waste collected annually was less compared to the projected generation. (*Refer to Table En-4)*

Table En- 4: **Estimated Volume of Solid Waste Generated, Volume of Waste Collected and Disposed: 2013-2015**

Year	Projected Population	Per Capita	Estimated Waste Generation		Volume of Solid Waste Collected/Disposed
		Kg/d	Kg/d	cu.m./year	cu.m./year
2016	2,975,876	.9709	1,057,475,751	281,288,549,786	2,343,787
2017	3.016,277	1.0032	1,104,464,117	293,787,454,999	1,832,689
2018	3,057,322	1.0366	1,156,765,295	307,699,568,363	1,628,554

Source: EPWMD

Note:
Projected Population: *2016 and 2017 based on 2010 NSO Population Survey*
2018 based on 2015 PSA Census of Population
Waste Generation/day: *Based on updated 10-year Solid Waste Management Plan 2015-2021*
Waste Density: *266 kg/cu.m.*

Table En- 5: **Volume of Waste Reduction: 2016-2018**

Year	Waste Reduction		
	cu.m.	Tons/day	%
2016	2,677,451	562,264.70	53.31%
2017	3,330,255	699,353.52	64.47%
2018	2,720,188	723,570.00	62.55%

Source: EPWMD

Table En- 6: **Barangays with Programs and Projects in Compliance with Republic Act 9003: 2018**

RA 9003 Requirements	District						
	I	II	III	IV	V	VI	Total
With Solid Waste Management Committee	37	5	37	38	14	11	142
With Solid Waste Management Plan	37	5	37	38	14	11	142
With Materials Recovery Facility	13	3	18	13	5	5	57
With Materials Recovery System	24	2	19	25	9	6	85

Source: EPWMD

Disposal

Since the closure of the Payatas Sanitary Landfill in July 2017, the disposal of the City's solid wastes has transferred to the 19 hectare Rizal Provincial Sanitary Landfill (formerly called Montalban Landfill) operated by the Rizal Provincial Government.

Post-Closure Care and Maintenance of the Payatas Controlled Disposal Facility

The post closure care of the Payatas Controlled Disposal Facility is being undertaken to ensure its safety to human health and the environment. As part of the greening program, there are about 12,000 trees planted in the facility and landfill area covering more than 3,200 sqm. In addition to the tree-planting project, the following activities and improvements were undertaken thereat: Asphalt Overlay on Access Road, Land Development, Filling and Compaction, Perimeter Fence with Vertical Garden, Energy Efficient Streetlight, Improvement and Repair of Leachate Collection System, Improvement and Repair of Drainage System, Slope Protection and Erosion Control, Installation of Pre-Fabricated Plant Box and Improvement of Security Post.

Monitoring and ground maintenance is also implemented as part of the post-closure and maintenance. About 25,000 sqm or 11% of the total area of the facility was cleared and cleaned thru grass cutting and de-clogging of the drainage system. Coordination with the Engineering Department resulted to the on-going Sheet Pile Project which commenced last November 2018. The project, which will take a year to complete, will be installed to prevent lateral movement of slopes that will protect the residents and the nearby areas.

Also, a comprehensive solid waste management plan for the landfill is underway. The study shows that three alternative schemes are possible for the final land use of the facility: as a recreational park (which will require passive site intervention), as a memorial park (which will require moderate site intervention), and as a mixed-use development (which will require aggressive site intervention).

Solid Waste Management

In compliance with Republic Act 9003, Quezon City was the first city in Metro Manila to have its own 10- year Solid Waste Management Plan approved by the National Solid Waste Management Commission through its Resolution No. 1074,S- 2018 (Annex ____) . This has gained national acclaim as the first urban city to implement the Solid Waste Management Act produced and spearheaded by the EPWMD. The QC Solid Waste Management Plan of QC is continuously updated to include a long term and sustainable solution to QC's growing waste generation by considering modern technologies that are both environment friendly and socially acceptable.

Solid Waste Management Projects

- **Materials Recovery Project** – The facility was established to further reduce the amount of wastes that are disposed at landfills. Eight (8) MRF Stations were set up and manned waste pickers and junk traders were organized to do further segregation and buying of recyclable materials and other saleable goods.

- **Biogas Emission Reduction Project**–The City operates the first Clean Development Mechanism (CDM) project. The biogas emission reduction facility is the product of an agreement of the city government with the Italian firm, PANGEA Green Energy and its local counterpart, PANGEA Philippines. Memorandum of Agreement with PANGEA was signed on February 14, 2007. The facility extracts, collects, processes and converts biogas into electricity. The project does not only reduce the greenhouse gas emission of the landfill but also acts as source of renewable energy which financially benefits the City thru the 5% share from the sale of electricity to Meralco .It also provides power to the Sanitary Landfill.

  Report from the EPWMD showed that as of February 2018, the total power exported to Meralco is 27,681,431.20 kWh since the implementation of the commercial expanded plant in March 2013. With that figure, the City already received a total amount of Php6,678,488.84 as part of its share from the sale of electricity.

  On November 2018, the City Government and PANGEA entered into a Lease Agreement for another nine (9) years which commenced on March 1, 2018. Under the new Agreement, the City will receive biogas royalties in the amount equivalent to 1% of its net proceeds from electricity sales as payment for the biogas extracted from the Facility. It is also indicated in the Agreement that any emission or discharge brought about by the Biogas Plant Facility shall be addressed by PANGEA.

- **Establishment of Waste to Energy (WTE) Project**– In September 2016, a consortium led by Metro Pacific Investments Corporation (MPIC) submitted an Unsolicited Proposal to the Quezon City Government for the establishment of an Integrated Solid Waste Management Facility that will process and convert the City's solid waste into clean energy. The Project involves the design, financing, construction, operation and maintenance of an integrated solid waste-to-energy facility capable of processing up to 3,000 metric tons per day of solid waste.

  The Project will be awarded to the consortium/original proponent since no comparative proposals were received by the city government on bid submission date in February 2019. However, the City Council failed to pass a resolution authorizing the Mayor to enter into a contract with the consortium as the Council went on recess early due to the midterm elections.

Waste Management Initiatives

- **Collection and Disposal Services**
  - Package Clean-Up System – The City has been recognized as the first local government unit to implement a successful and effective package clean up system on garbage collection and disposal. In a Package Clean Up System, the private sector is given full responsibility to administer and directly carry-out the management of solid wastes from various sources in the total environmental upkeep of the assigned service area. Contracting out to private service providers is done thru competitive bidding i.e., thru provision of the following:
    - ✓ Solid Waste Cleaning, Collection and Disposal Services
    - ✓ Street Sweeping Services
    - ✓ Street Sweeping Services
    - ✓ IEC Campaign & Enforcement support, and
    - ✓ Operation and maintenance of staging areas

This system has made the city's garbage collection consistently more than 99% efficient thru the years.

- Dedicated Collection – Door-to-door collection system for biodegradable and non-biodegradable wastes

- **Community-based Projects**
  - Hiwa-hiwalay na Basurasa Barangay Project – Waste segregation at source and dedicated collection of wastes
  - Kitchen Wastes Collection – The project was implemented in barangays without Materials Recovery Facility or composting sites. EPWMD has accredited kitchen waste collectors for the project. This also does not entail additional hauling cost on the part of the City.
  - Bulky Waste Collection –Collection of bulky wastes such as logs, branches of trees and other bulky garden wastes. Collection is done every Sunday upon request by the barangay.
  - Recycling Activities – includes recyclables trading, operation of Materials Recovery Facility (MRF) or Materials Recovery System (MRS), junkshop integration and waste market day.

- **Institution-based Projects**
  - QC Hall Waste Management Segregation Project – This involves the implementation of waste segregation at source and recycling at the QC Hall Complex. As support to the Project, an MRF was constructed near Gate 3 of the Compound.
  - Recyclables Trading at QC Malls – The project promotes a convenient drop-off and buy back center in QC malls for both traditional and non-traditional recyclable wastes. It is a collaborative effort of Quezon City Government, QC Malls, junkshops and other recycling companies.
  - For scavengers making a livelihood from trash at Payatas, alternative livelihood opportunities are offered through trainings by QCLGU's Small Business Promotions Office.

- **School-based Projects**
  - Batang QC Eco-savers Club –aims to establish a waste segregation and recycling program in all public elementary and high schools in the hope of making recycling a part of their daily routine. The corresponding points recorded in the students' passbooks are used to "buy" school supplies or groceries.
  - Junior Environment Police (JEP) – This activity seeks to mobilize a movement for sustainable environmental management thru awareness, respect for law and the environment among the youth, thereby molding a responsible and environmentally-concerned citizen.

- **Clean-Up Operations**
  - Special Cleaning Operations –The Special Cleaning Operations Groups (SCOG) is formed to conduct cleaning and clearing operations in preparation for various events and activities.
  - War on Waste –The city conducts annual war on waste project and encourages public and private participation to do massive clean-up operations to help combat solid waste problems.

- **Environmental Enforcement & Inspection**
  - Zero Litter Campaign – serves as a total clean-up mechanism for the City which includes the apprehension of violators on proper solid waste management, cleaning and beautification, clearing of obstructions, collection of garbage and massive IEC campaign thru distribution of letters and IEC materials.

- Deputized Environmental Enforcers to conduct regular roving, fixed-posting and night operations along city's major thoroughfares and identified litter or dumping-prone areas to ensure cleanliness in the city.
- Green Desk Project – Police officers from twelve (12) police stations were deputized to handle environment-related cases.
- Community (Barangay) Participatory Watch – aims to monitor and ensure the compliance of barangays and to assess and improve their solid waste management system.

- **Incentive Mechanism**
  - Deputized cash incentives for communities/barangays practicing effective waste reduction measures.
  - Cash incentives for communities/barangays utilizing their own barangay truck for the collection of solid wastes.
  - Recognition thru various awards such as Seal of Good Housekeeping, Recognition of Best Practices by the QC Solid Waste Management Board, etc.
  - Provision of financial support for the establishment of Materials Recovery Facilities, procurement of tri-bikes and pushcarts for the door-to-door collection of recyclable materials.

5.1.2 Hazardous Wastes

Hazardous Wastes – Under DENR Administrative Order No. 29 Series of 1992, hazardous waste is defined as substances that are without any safe commercial, industrial, agricultural or economic usage. It also refer to by-products, side-products, process residues, spent reaction media, contaminated plant or equipment or other substances from manufacturing operations and as consumer discards of manufactured products which present unreasonable risk and/or injury to health and safety and to the environment.

In Quezon City, hazardous wastes are excluded in the scope of regular collection of solid wastes. With this, the City implemented City Council Ordinance No. SP-1483, S-2005 which required all residents and business establishments to segregate spent fluorescent light bulbs from the regular collection of solid waste. Selected MRFs are being used as areas for disposal for busted bulbs from households.

Of the almost 65,000 registered businesses in Quezon City, 2,233 (3.46%) are generally categorized as manufacturing which does not allow the distinction of industries actually producing toxic and hazardous wastes. The monitoring system is too weak to pinpoint sources.

Program/Project

- **Collection, Transport, Treatment and Disposal of Busted Fluorescent Lights (BFLs) and Used Household Batteries**– The project, which is carried out in partnership with DOLOMATRIX TSD Facility, aims to ensure that busted fluorescent lamps and spent households batteries are handled properly and separately from other non-toxic/non-hazardous household, commercial, industrial and institutional wastes for proper treatment and stabilization before its final disposal.

5.2 AMBIENT AIR QUALITY

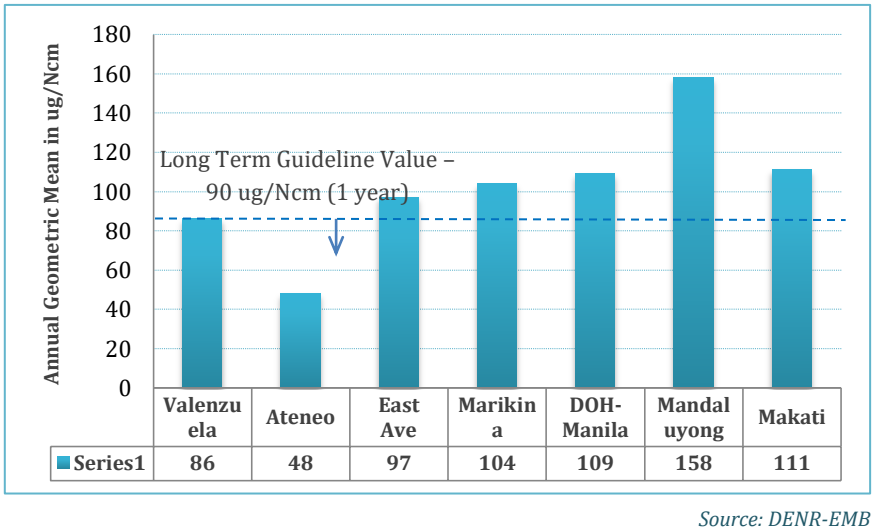
5.2.1 Total Suspended Particulates (TSP)

Total Suspended Particulates is defined as the "small airborne particles such as dust, fume and smoke with diameters of less than 100 micrometers. They are emitted from various sources including power stations, construction activities, incineration and vehicles.

The Environmental Management Bureau- National Capital Region (EMB-NCR) is operating and maintaining twelve (12) manual ambient air quality monitoring stations which are strategically located in various areas in Metro Manila, namely:

- Manila Observatory Compound –Ateneo de Manila University Campus, Katipunan Road;
- National Ecology Center-East Avenue;
- National Printing Office, EDSA
- Marikina Sports Complex, Sumulong Highway;
- DOH, Rizal Avenue
- Mandaluyong City Hall, Maysilo Circle
- MMDA Compound, EDSA
- Pasay Rotunda Station, EDSA cor Taft Avenue;
- Radyong Bayan Compound in Marulas Valenzuela,
- NAMRIA Compound
- Lawton Avenue
- MuntinlupaBilibid Prison Compound.

Manila Observatory Compound at Ateneo de Manila University is dedicated for general ambient air monitoring while National Ecology Center-East Avenue and National Printing Office, EDSA are for the measurements of roadside ambient air monitoring.



Source: DENR-EMB

Figure En-1: **TSP Concentration Annual Geometric Mean Registered at Different Monitoring Stations (2015)**

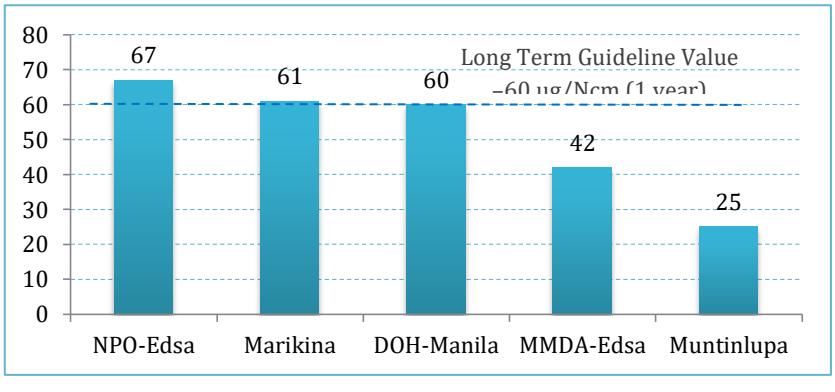
Above graph shows the results of the ambient (roadside and general monitoring in the seven (7) air quality monitoring stations measuring Total Suspended Particulates for 2015. Ateneo station recorded annual geometric mean average of 48 ug/Ncm which is 53% lower than the guideline value of 90ug/Ncm. The data reveals that despite the heavy traffic situation in Katipunan Avenue during school days, the carbon emission is sequestered with the presence of thriving flora along the periphery and within the grounds of the Ateneo de Manila Campus. Another is from East Avenue Station reflected an annual TSP geometric average of 97ug/Ncm which is slightly higher than the long term guideline value. Moderate to heavy traffic was observed within the vicinity almost throughout the year as it is bounded by the National Government Center, tertiary hospitals and commercial establishments. Conversely, other monitoring stations located outside Quezon City did not meet the standard annual TSP long term guideline value of 90 µg/ except in Marulas, Valenzuela City with a recorded annual geometric mean average of 86 ug/Ncm.

5.2.2 Particulate Matter (PM10)

PM10 are smaller particles that are likely responsible for adverse health effects because of their ability to reach the lower regions of the respiratory tract. The PM10 standard includes particles with a diameter of 10 micrometers or less (0.0004 inches or one/seventh (1/7) of the diameter of a human hair. The long term guideline value set for PM10 is 60 mcg/cm.

Potential health effects of exposure to PM10 include the effects on breathing and respiratory system, damage to lung tissue, cancer, and premature death. The elderly, children, and people with chronic lung disease, influenza, or asthma, are especially sensitive to the effects of particulate matter. PM10 comes from mobile and stationary motor vehicles, woodstoves, power plants, domestic and industrial fuel burning activities to name a few. Their chemical and physical compositions vary widely. Particulate matter can be directly emitted or can be formed in the atmosphere when gaseous pollutants such as SO2 and NOx react to form fine particles.

From graph below, showed that NPO-EDSA station registered the highest concentration which exceeded the long term guideline value of 60 ug/Ncm. This station is located roadside and is exposed to motor vehicle exhaust emission and other area sources.



Source: DENR-EMB

Figure En-2: **Annual Comparative Readings of PM-10 at Different Stations (2015)**

5.2.3 Greenhouse Gas Inventory

Emissions inventory is an estimate of air pollutants based on an emission factor and an activity indicator. It typically changes over time because of improvements in data or changes in source operating conditions. A capacity building program on the conduct of a Greenhouse Gas (GHG) Inventory was initiated by the City Government in 2011 for the Environment Policy Management

Council (EPMC). The following table shows the results of the Government Operations GHG Emissions inventory:

Table En- 7: **GHG Emission Inventory Result on Government Operations: 2011**

Sector	Total eCO2 (kg)	% share
Buildings	39,000,857.99	62
Transport	6,289,050.28	10
Streetlights	14,922,134.77	24
Waste	2,268,847.17	4
Total	**62,480,890.21**	**100**

Year 2010 was used as the base year since it was the most complete year showing emissions from the owned and operated facilities of the Quezon City Government. A total of 62,480,890.21 kgs.of carbon dioxide (eCO2) has been computed.

On the same year, a similar project spearheaded by Climate Change and Clean Energy Project (Cenergy) was conducted in the community level, results of which were the following:

Table En- 8: **GHG Emission Inventory Result in the Community Level; 2011**

Emission Sources	2010 Volume	Unit	Total Emissions (tCO2e)	% per Emission Source
Transportation	289,775,687.47	Liters	**709,806,272.66**	99.51
Other Sectors:				
StationaryEnergy – Electricity	*3,926,193*	*MWh*	*2,038,479.59*	
Stationary Energy – Fuel	*403,328*	*Liters*	*961,844.98*	
SolidWastes	*705,640*	*Tons*	*270,605.34*	
WasteWater – Septic Tanks	*37,290,341*	*kgBOD*	*234,929.15*	
Sub-Total of Other Sectors	445,250,234.61		**3,505,859.06**	0.49
Total			**713,312,131.72**	
(Forestry)	2,546	hectares	(31,742.86)	
Grand Total			**713,280,388.86**	**100**

The calculated greenhouse gas emissions from fuel sales, electricity consumed and solid wastes and wastewater generated in the city in 2010 is 713,312,131.72 tons of carbon dioxide equivalent. With 2,545.89 hectares of forest land that is able to sequester approximately 31,743 tons of carbon dioxide equivalent, the total emissions of the city has been reduced to 713,280,388.86 tons of carbon dioxide equivalent.

In 2016, the Quezon City Government, as member of the C40 Cities Climate Leadership Group, received technical assistance in the update the city's GHG inventory. Using 2016 as base year, the

GHG Inventory was updated through the Global Protocol for Community-Scale (GPC) using the City Inventory Reporting and Information System (CIRIS) Tool established by the C40 Group.

The inventory shows that stationary energy, which covers electricity consumption, is the predominant source of GHG emissions in the city.

5.2.4. Energy Efficiency

Street lighting comprised 65 percent of Quezon City's electricity costs or about 5 percent of its annual budget. The desire to reduce energy costs and allocate resources to other priorities was a key driver behind Quezon City's action on energy efficient street lighting.

Lighting System

In addition to Quezon City's long commitment to environmental improvement, its recent experience promulgating energy efficiency policies and the availability of technical assistance from the World Bank Institute (WBI) were additional factors enabling the City's LED streetlight initiative

The City Government, in cooperation with the Road Board thru its, National Lightning Project is converting the city's streetlights into more energy-efficient LED (Light Emitting Diode) lights. The LED lampposts are being installed around the Quezon Memorial Circle, along Quezon Avenue, Commonwealth Avenue(Philcoa to TandangSora), along Mother Ignacia, Timog, Tomas Morato and East Avenues. LED conversion will eventually reduce the annual electricity consumption of the city.

Another project is the replacement of incandescent bulbs with more energy-efficient compact fluorescent (CFL) bulbs in the city's markets such as Frisco, Galas, Litex, Luzon and Murphy in partnership with Global Philips Electronics & Lightning, Incorporated.

Table: En-9: **Status of Existing Streetlight per District (2015)**

District	Total Existing Streetlight	LED Installed	No. Of streetlights to be converted
I	4413	1,372	3041
II	2227	715	1512
III	3115	1024	2091
IV	6487	3324	3163
V	5009	1285	3724
VI	3942	1128	2714
Total	**25,193**	**8,948**	**16,245**

Source: Task Force Street Lightning

Table En-9 showed that, as of 2015, **a** total of 25,193 streetlights are existing in the city and 8,948 are being replaced by LED (Light Emitting Diode)lights and the remaining 16,245 will be replaced in the next two years.

Other Alternative Energy Solution Initiatives

- Electricity from the biogas emission reduction project- In November 2018, the City Government and PANGEA entered into a 9-year lease agreement where the QC-LGU will receive biogas royalties in the amount equivalent to 1% of its net proceeds from electricity sales as payment for the biogas extracted from the facility.

- Electrical Vehicles - The city has started to promote green transport by purchasing electronic tricycles and electronic jeepneys. Key benefits of using EVs is its zero emission of harmful air pollutants and greenhouse gases which greatly reduces the smoke emitted from fossil fuels of gas-fed vehicles. In June 2019, QC has been a recipient of 300 electric tricycles (e-trikes) from the Department of Energy (DOE's) program to promote energy efficiency and clean technologies in the transport sector. The deployment of these e-trikes is a big part of the city governments' initiatives to eventually replace around 25,000 tricycles with e-trikes in the city.

- Solar panel system - Mindful of the high electricity expenses needed to maintain the city's large network of public schools, using alternative and renewable sources of energy such as solar power has been adopted by the city government since 2014. Presently, the city has already installed solar panels to three buildings in Commonwealth High School and is set to further solarize 146 public schools all over the city to save on utility bills .

- WTE Plant - QC has been quite aggressive in the field of renewable energy and is set to build its own waste-to-energy plant as part of its green waste management program. The project which will be undertaken through a joint venture between the QC government and the Metro Pacific Investments Corporation (MPIC). a pioneering program and the First in the Philippines, the project is set to process and convert up to 3,000 metric tons of municipal solid waste a day into 42 megawatts of renewable energy over a concession period of 35 years.

5.2.5 Compliance to Green Building Ordinance

The Quezon City **Green Building** Ordinance of 2009 (Ordinance No. SP-1917, S-2009) which necessitates that **buildings** (for both new structures and those undergoing retrofitting) within the city including movable properties and other structures follow minimum standards of **green** infrastructure in their design and construction is lodged under the Department of the Building Official. Since its enactment in 2009, a total of 153 green building applications were already given preliminary certifications, about 38 are on process while 23 were given final green building certifications;; 98 applications are subject to review and evaluation.

Under the IRR, commercial, institutional or industrial buildings with floor areas of at least 2,000 square meters are required to comply with the Green Building Standards. While the ordinance would surely add to the cost of construction of new buildings, it provides an incentive in the form of tax credits for land users, developers and planners who would use environment-friendly technologies in their buildings.

5.2.6 Compliance to Environmental Standards

The Environmental Management Bureau –National Capital Region (EMB-NCR) is authorized to process and evaluate applications for Environmental Compliance Certificate (ECC). Based on DENR Administrative Order (DAO) 2003-30, projects that are located within environmentally critical areas and are considered to pose significant environmental threats and adverse environmental impacts, are subject to the application of ECC. On the other hand, projects that do not fall within the purview of the Philippines Environmental Impact System are subject to the application of Certificate of Non-Coverage (CNC). As per Bureau's report, a total of 364 new and amended ECCs and 319 CNCs were

processed and issued for the year 2015 in National Capital Region. The highest number of application was observed in Quezon City with 58 and 120 respectively.

Pollution Control Programs

- **Clean Air Program**

  - Anti-Smoke Belching – roadside apprehension of drivers and operators and testing of motor vehicles using the certified smoke emission testing machine along roadsides. Flyers are also distributed to passing motorists to bolster information and education campaign. Through continuous anti-smoke belching operations, motorists are influenced to follow set emission standards to improve the people's health and well-being and contribute to environmental protection.

    In the conduct of anti-smoke belching operations within Quezon City, two(2) units of E-vehicles arepresently being used by the Anti-Smoke Belching Unit of the EPWMD. Three (3) teams are deployed, each composed of eight (8) personnel with pecific designated positions, namely: Team Leader, Spotter, Flagger, Apprehending Officer, Machine Operator, Depressor, Prober, and Ticket Issuing Officer.

  - Transport Summit – To increase awareness on air pollution and proper vehicle maintenance to lessen emissions of harmful pollutants.

  - Industrial Inspection and Monitoring of Business Establishments – includes rigid inspection and monitoring of business establishments prior to the issuance of pollution clearance.

  - Closing down of unscrupulous emission testing centers

  - Creation and promotion of routes for E-vehicles and bike lanes

  - Banningof open-pit burning and smog creating-activities

5.3 WATER QUALITY

5.3.1 Groundwater Resource

Groundwater Levels

According to the final report on the 2004 study on the Water Resources Assessment for Prioritized Critical Areas (Phase I) of the National Water Resources Board (NWRB), the groundwater levels in Metro Manila have declined sharply over the decades. A comparison between the 1955 and 1994 piezometric water levels showed that the groundwater flow pattern significantly changed due to excessive extraction of water from the aquifer. Three prominent cones of depression were noted in Paranaque, Pasig and Valenzuela. In Quezon City, a relatively small area adjacent to Caloocan and Valenzuela had a groundwater level 20 meters below mean sea water level and the Libis-Ugong Norte near Pasig had 40 to 80 meters below sea level in 1994. In 2004, the decline progressed

steeply as almost the whole stretch of Novaliches from Balintawak to Kaligayahan experienced levels ranging from -20 to -120 meters – said to be among the deepest declines happening in Metro Manila over the years. This only means much great danger of saltwater intrusion and having groundwater unfit for human consumption in the city.

Groundwater Abstraction

The decline in water levels and the depletion of groundwater resource are attributed to massive withdrawal of water from the aquifer. Aside from the groundwater abstraction of MWSS equivalent to 3% of the total water supply for Metro Manila, wells legally registered with the NWRB were extracting groundwater at the rate of 12,823.53 liters/second in 2010. However, it is believed that the actual withdrawal is 70% more due to illegal abstraction. NWRB has no segregated data for Quezon City except for the number of well permits granted as of December 2013. *(Refer to Table En- 10)*

Table En- 10: **Well Permitees by Purpose; Quezon City: as of December 2013**

Purpose	No. of Permits Granted
Commercial	27
Domestic	47
Industrial	26
Hospitals	8
Irrigation	7
Livestock	3
Municipal	9
Fire Protection	1
Total	**128**

Source: NWRB

5.3.2 Natural Waterways

Numerous rivers and creeks crisscross the territory of Quezon City. They are extensive and serve best as network for natural drainage. They form part of the river basins covering the city's landscape, the largest of which are the Malabon –Navotas – Tullahan–Tinajeros River System and the San Juan – Pasig River Basin. Two major concerns that confront the City's natural waterways are pollution and the loss of creek and river easements.

Pollution of the City's River System in Relation to Pasig River

The greater part of Quezon City and its river system drains into the Pasig River System. The QC area comprises 80 sq.km of San Juan River Basin(which has an area of 87 sq.km.) and about 8 to 9 sq. km.) of the Marikina Downstream River Basin (covering an area of 17 sq. km.). Aside from high population concentration in these areas, the greater majority of commercial and industrial establishments in the city are likewise located here.

Pollution of the City's River System in Relation to Manila Bay

Situated in the northern part of Quezon City, the Novaliches watershed is the upstream of the Malabon – Navotas – Tullahan–Tinajeros (MaNaTuTi) River Systemwhich runs through the cities of Malabon and Navotas, and finally empties to Manila Bay. The river system has a combined length of 23km and the widest span width of 60m in Navotas City. The MaNaTuTi River System has a catchment area of 69.25 square kilometers. The La Mesa Dam controls the headwater of the said river system. The area is highly populated and majority of industrial establishments are located.

Sources of Water Pollution

There are two (2) general sources of pollution: point source and non-point source. Point source means any identifiable pollution source with specific discharge point into a particular water body. Non-point sources have no identifiable source and include run-off from irrigation or rainwater that picks up pollutants from farm and urban areas.

A study shows that domestic wastewater discharge accounts for the highest pollution load introduced to Manila Bay. Only 18 percent of the wastewater generated in Metro Manila householdsis collected by localized separate sewerage systems. Nearly all of these are discharged through outfalls into Manila Bay. Most residential wastewater of about 82% is discharged into the public drainage system either directly or through septic tanks. These septic tanks are not desludged and the effluent discharged into the water bodies are essentially untreated, causing heavy pollution everywhere in Metro Manila, particularly in high density areas. *(Sources: http//www.worldbank.org.ph and MWSS, 2003)*

The water quality degradation of the fresh water bodies could be attributed to the wastewater effluent coming from the industries, leaking sewers and septic tanks, direct discharge of animal wastes and of polyphosphates from detergents, run-offs and improper dumping of solid wastes.

Non-Biodegrable Wastes

Studies have identified plastic bags as a significant contributor to waterways pollution. The city government has taken a strong position on the regulation on the use of plastic bags from consumers through the Plastic Bag Ordinance (SP2140,S-2012). Consumers who opt to use plastic bags are charged P2.00/bag that goes into a "Green Fund". Since its enactment (last quarter of 2012), total green fund collected has already amounted to Php 337,147,576.00. Of this amount, Php 23.8 million has been used to fund environmental projects proposed by the retailers themselves. In addition, 7,985,108 pieces of plastic bags have been recovered since its implementation.

Table En-11 : **Green Fund Projects 2017-2018**

Data of Implementation	Project Title	Project Partner	Retailer	Amount Utilized
May 2017	Shoot that Kalat	10 sets of segregation bins for each of the 27 selected QC public schools	Puregold Price Club	1571572.80
June 2017	Clean drive one trash bin, one cleaner future	10 sets of segregation bins for each of the 18 selected QC public schools	Robinsons Handyman	880,000.00
Sept 2017	Recycled school chairs	800 recycled school chairs to Demetrio Tuazon Elem. School	SM Cubao	1450000.00
Oct 2017	e-Bike	7 e-bicycles for each of the 5 selected QC police stations	Mercury Drug	669200

Oct 2018	MRF and composting	Establish MRF and composting area at Ponciano Bernardo Elem School	Zagu Foods Corp	299,574.72
Dec 2018	e-Trikes for community Safety and Security	2 e-trikes for each of the 34 selected bgys in QC	Rustan Supercenters , Inc.	17,208,600.00

Source: EPWMD

The Green Fund Project is an instrument produced by the EPWMD which is intended to evaluate the current solid waste management practices, provide the vision and direction for future solid waste management, and set guideposts for waste disposal over a 10-year period. Waste-to-Energy project, another break through being considered by the QC Government is part of this vision and direction.

Water Quality Assessment

Water quality is assessed on the basis of a set of beneficial uses as defined in the DENR Administrative Order 34, S-1990. There are thirty-three (33) parameters that define the desired water quality per water body classification. Parameters monitored include:

- Dissolved oxygen (DO), biochemical oxygen demand (BOD), total suspended solids (TSS), total dissolved solids (TDS), and heavy metals for inland surface waters.

- Fecal Coliform, nitrates, and salinity (chloride content) for groundwater as defined in the Philippine National Standards for Drinking Water (PNSDW)

- DO, Coliform, and heavy metals for coastal and marine waters.

Lack of dissolved oxygen (DO) in the river during the dry season is the main reason for its offensive odor and the lack of biological life. Low DO levels are the result of the discharge of domestic and industrial wastes from communities and industrial sites.

Biological oxygen demand (BOD), on the other hand, measures the amount of oxygen consumed by microorganisms in decomposing organic matter in stream water. The higher BOD value indicates more pollution.

Water Quality Monitoring Stations

Malabon – Navotas – Tullahan–Tinajeros River System

There are fifteen (15) monitoring stations established in MaNaTuTi River System, five (5) stations are located in Quezon City namely, Sarmiento Station in Bgy. Sta. Monica, Gulod Station in Gulod Bridge, Bgy. Gulod, Northridge Station in Northridge Park Subd. Bgy. Sta. Monica, Dahlia Station in Dahlia Avenue, and Fairview Stationin Fairview Bridge both located in Bgy. Fairview.

Table En-12: **Results of the Water Quality Monitoring Stations: Meycauayan-Navotas-Tullahan-Tenejeros River System (Matatuti); 2013-2015**

Water Quality Parameters	2013	2014	2015
	Mg/L		
Biochemical Oxygen Demand(BOD) 7 mg/L below	35.86	39.19	39.00
Dissolve Oxygen(DO) 5 mg/L Up)	00.06	00.00	00.00
Total Suspended Solids(TSS) 10 mg/L	33.89	39.61	13.00
Oil & Grease (2 mg/L)	4.64	4.17	4.10

Based on the Table En-12, the annual recorded results of all the monitoring stations located in Quezon City, and also the other monitoring stations located in Malabon and Navotas did not pass the DENR Water Quality Criterion for the past 3 years. This indicates that Matatuti River System is not capable in carrying aquatic life.

San Juan – Pasig River System

There are eight (8) water monitoring stations located in Quezon City, namely Ermitanyo Station in Aurora Blvd.Cubao, Diliman Station in Umbel St. Bgy. Kalusugan, Kaliraya Station in Bgy. Tatalon, Mariablo Station in Roosevelt Avenue, Bgy. Sta. Cruz, Talayan Station in Bgy. Talayan, Caroline Station in MH delPilar, Bgy. San Antonio, Dario Station in EDSA and Culiat Station in Bgy.Culiat.

Table En-13_: **Results of the different water quality parameters: San Juan River Monitoring Stations; 2014-2015**

Location of Station	Name of Creek	Biochemical Oxygen Demand(BOD) 7 mg/L below		Dissolve Oxygen(DO) 5 mg/L Up)		Total Suspended Solids(TSS) 10 mg/L		Oil & Grease (2 mg/L)	
		2014	2015	2014	2015	2014	2015	2014	2015
Aurora Blvd. Broadway	Ermitanyo	58.00	54.75	0.00	0.42	0.00	53.33	5.60	5.18
Umbel St., Kalusugan	Diliman	56.00	76.42	0.00	0.34	0.00	61.67	5.80	6.08
Kaliraya St. Tatalon	Kaliraya	57.8	57.67	0.00	0.36	0.00	51.67	5.20	5.45
Roosevelt Avenue, Sta. Cruz	Mariablo	57.5	54.76	0.00	0.58	0.00	54.17	4.70	5.32
Araneta, Talayan	Talayan	83.22	78.58	0.00	0.33	0.00	64.17	6.30	5.71
MH Del Pilar, San Antonio	Caroline	52.5	58.08	0.00	0.50	0.00	49.17	4.30	5.23
EDSA	Dario	63.50	57.08	0.00	0.86	0.00	51.67	5.00	5.23
Edsa, Culiat	Culiat	48.5	53.00	0.00	1.02	0.00	50.00	4.20	5.14

Based on the Table En-12, the recorded results of all the monitoring stations located in Quezon City did not pass the DENR Water Quality Criterion for the past 2 years. This implies that San Juan River System is not capable of supporting marine life.

Encroachment of Creeks and River Easements

Ocular inspection of the rivers and creeks and their tributaries shows that easements and riverbanks, as defined and provided for by the law, are no longer existent. Many are occupied by structures belonging to affluent and poor families alike.

Table En-14_: **Illegally Encroached Structures Along Rivers and Creeks, 2016**

Waterways	No. of Families	No. of Structures
Creekside	7,384	6,047
San Juan River	1,335	987
PRRC	2,454	2,481
Tullahan River	1,621	1,908
Marikina River – Flood Plains	1,519	1,357
Total	**14,313**	**12,780**

Source: HCDRD

According to the 2016 census of the Housing, Community Development and Resettlement Department (HCDRD), there are 14,313 families occupying 12,780 structures along creek and river easements. *(See Table En-14)*

Physical development in some areas has also resulted in the narrowing of creeks and rivers and even loss of some segments on these waterways. There are also instances where the creek has been covered, diverted, and in some cases, reclaimed to generate building lots.

Programs/Projects

- **Riverways Cleaning and Management Program**–The program seeks to clean and maintain the aesthetic condition of the city's rivers and creeks with active community involvement. The project has visible impact in terms of enhancing the physical environment and demonstrating strong partnership with the community and at the same time provide employment opportunity to poor residents.

  For 2018, the Riverways Cleaning Operations Group (RCOG) of the EPWMD, through the conduct of manual clean-up operations, collected a total of 1,499.34 cubic meters of river wastes covering approximately 202.7 linear kilometers of riverways

  Said undertaking likewise is a coordinative effort for the inter-agency implementation of the Supreme Court Continuing Mandamus (a court order handed down on _____ ordering all concerned government agencies to coordinate in the clean up, rehabilitation, preservation, restoration and maintenance of the waters of Manila Bay to a Class B level. In a recently concluded LGU Compliance Assessment in relation to the Manila Bay Clean up Program, Quezon City ranked 1st among all LGU's in Metro Manila with an overall average score of 95%.

- C**lean-up Operation for Dengue Prevention** – This project is being implemented to reduce dengue cases in highly affected barangays in the city.

- **Adopt-an-Estero WaterbodyProgram –**engaging stakeholders and partners as a collaborative undertaking among the DENR, LGUs, estero communities and donor-partners to select a beneficiary creek/estero for its rehabilitation and maintenance.

- **Lingap-Sapa** – a citywide effort that promotes community participation in the clean-up of waterways.

- **International Coastal Clean-Up** – The city government supports and participates in the annual International Coastal Clean-up (ICC) conducted every September.

- **Posting of Signage and Plates** – Ordinance plates and signage are posted along conspicuous and dumping prone areas within the city so that the constituency may be reminded to keep the environment clean and garbage-free at all times.

Automatic Trash Rake Facility in

- **Automatic Trash Rake (ATR) Facility** –It aims to design and develop an alternative measure to de-clog rivers/creeks and improve the operation of flood control facility. The ATR is an inclined conveyor-type garbage collection mechanism intended to improve garbage collection compared with the manual method which is used in Quezon City. The automatic trash rake facility is located at Balingasa Creek specifically along G. Araneta (Center Island) near Mauban St., at the boundary of Barangays Manresa and Masambong. It was turned-over by the Department of Science and Technology to the Quezon City Government on December 3, 2014 and became fully operational on February of 2015.

5.4 PARKS AND OPEN SPACES

Endowed with the biggest land resource in Metro Manila, Quezon City boasts of numerous parks and open spaces, both vast and small. The inventory consists of major and special parks that are themselves unique in terms of size, features, and even biodiversity; historical parks and shrines. It also includes reserves and potential areas adding to the City's expansive network of open spaces like institutional grounds (UP, Ateneo de Manila University, Miriam College, Congress, and the like), golf courses, corridors or right-of-ways and river easements.

The Quezon City Parks Development and Administration Department (PDAD) reported that out of the city's 598 parks and open spaces, 259 are developed, 67 are partially developed and 275 are undeveloped. District V has the most number of developed and undeveloped parks numbering to70 and 60 respectively. *(See Table En-15)*

Table En-15: **Status of Parks/Open Spaces per District: December 2018**

Status	DISTRICT						Total
	I	II	III	IV	V	VI	
Developed	38	23	42	27	70	59	259
Partially Developed	2	4	7	1	25	28	67
Undeveloped	42	49	31	36	60	54	275
Total	82	76	80	64	155	141	598

Source: PDAD

5.4.1 Major and Special Parks

Quezon Memorial Circle

The Quezon Memorial Circle (QMC), the central park of the city, is a 25-hectare public realm best known for being home to the Shrine, Museum and remains of Manuel L. Quezon. Located at the heart of the City, it serves as the core and unifying element of the city's Open Space Network System (Garden City) because of its strategic location and high visibility.

The major components of the QMC are the following:

- Quezon Memorial Monument (Pylon) and shrine, the central element of QMC and the point reference for all development programs, projects and activities
- QCX and Museum
- Meditative area
- Parks, playground and other recreational areas
- Venue for social interaction, socio-cultural exchange, celebrations and other public gatherings
- Venue for facilities for arts and culture and historical heritage promotion
- Environment protection showcase area
- Economic enterprise area

Data from the QMC Administration Office showed that visitors of the park ranged from 12,000 to 15,000 during weekdays and 25,000 to 30,000 during weekends and holidays.

Ninoy Aquino Parks and Wildlife Center

The Ninoy Aquino Parks and Wildlife Center (NAPWC) is the only zoological and botanical garden with an area of 19.29 has.located at the southwest of the Quezon Memorial Circle. It houses various species of endemic and endangered birds, mammals, reptiles and amphibians in the open-air mini-zoo and Wildlife Rescue Center.It also serves as a venue for public education, as a training and research facility for future veterinarians and biologists, and as a source of wildlife stock for local zoos and DENR-accredited facilities for their public education, breeding, and other conservation-oriented undertakings. Other amenities include cottages for conferences, meetings, seminars and other gatherings, amphitheater, children's playground, visitor's center, a man-made lagoon for fishing, tea house, picnic sheds, a rock garden and a craft village.

The NAPWC was proclaimed as a protected area and component of Republic Act No. 7586 or the National Integrated Protected Areas System (NIPAS) Act of 2004 as amended by RA 11038 (Expanded NIPAS Act of 2018) which envisions the Center as a world-class ecotourism destination and a venue for biodiversity conservation and education on Philippine endemic and rare wild flora and fauna.

NAPWC Office reported that visitors of NAPWC in the year 2014 and 2015 were 515,281 and 471,600 respectively. Total income generated in that period amounted to P 8,866,935.46.

La Mesa Watershed

The 24 hectare La Mesa Watershed is the last remaining forest of its size in Metro Manila – the so-called "Green Lung" of the Metropolis. With an area of about 2,700 hectares, it was declared as Watershed Reservation by virtue of Presidential Proclamation No. 1336 on 25 July 2007. Previously, the control of the La Mesa Watershed was under the jurisdiction of the Metropolitan Manila Waterworks and Sewerage System (MWSS) from 1971 by virtue of Republic Act No. 6234 until 2007. By virtue of Presidential Proclamation Number 1336, the Watershed is now under the joint administrative jurisdiction, supervision and control of the MWSS and the Department of Environment and Natural Resources (DENR).

Within the watershed is a reservoir of about 179 hectares that serves as water impounding structure supplying water for domestic and commercial use of some 12 million people in Metro Manila.

Another attraction that gives impact in the area is the 30-Hectare La Mesa Ecopark Resort, the biggest eco-tourism destination in Metro Manila. In a multi-stakeholder partnership among the QC LGU, ABS-CBN's Bantay Kalikasan Foundation and the MWSS, the park has been maintained and preserved as a combined a natural recreational refuge with educational purposes of an outdoor classroom envisioned to bring the people back to La Mesa as it did in the old days. Amenities include the Orchidarium, Butterfly Garden, Hanging Bridge, Picnic area and Eco-trails.

UP Arboretum

Measuring a mere sixteen hectares of the 493-hectare academic institution that is the Diliman campus of the University of the Philippines, the UP Botanical Garden and Arboretum supports a diverse collection of plants and wildlife, which, while not necessarily remarkable as compared to undisturbed ecosystems, can still be considered a compelling attempt at environmental preservation in the face of urban accretion and human threat.

Balara Filters Park

Balara Filters Park is a 60-hectare (150-acre) park located in the Diliman village of Bgy. Pansol, and is one of the oldest recreation areas in Quezon City having been first opened to the public in 1953. It occupies part of the old Balara Filtration Plant complex, one of the main treatment facilities for water coming from the La Mesa Dam. A surprising recreation spot where you get to travel back in time and marvel at Art Deco buildings. It features an elevated picnic grove, a mini-park for kids, the Balara Filtration Windmill, a replica of the Carriedo Fountain, the Anonas Amphitheate and buildings that stood the test of time. The park is administered by the Manila Water company in partnership with the Quezon City Parks Development and Administration Department.

Historical Parks and Shrines

The historical parks consist of the PugadLawin Shrine, TandangSora Shrine, A. Bonifacio Monument, Gen. Geronimo Monument, BantayogngmgaBayani, and People's Power Monument.

Other Open Spaces

Adding to the inventory of open spaces in the city are large institutional grounds like those of University of the Philippines, Ateneo de Manila University, Miriam College, QC Hall, House of Representatives compound, Veteran's Memorial Medical Center compound, V. Luna Medical Center, Camp Crame, and Camp Aguinaldo.

5.5 BIODIVERSITY

The City has richer wildlife compared with other cities in Metro Manila due to the size and nature of its parks and open spaces. Studies show that the parks and open spaces in Quezon City are habitat to numerous species of flora and fauna, some of which are classified as endemic or indigenous, exotic, endangered, highly endangered, or vulnerable.

In 2018, the City Government through the Environmental Protection and Waste Management Department, Parks Development and Administration Department and the City Planning and Development Department became part of the Urban Biodiversity Program of the Biodiversity Management Bureau (BMB) of the Department of Environment and Natural Resources.The program's objective is to do an inventory and conduct an assessment of the city's flora and fauna to create a City Biodiversity Index which will serve as a manual in the assessment and monitoring of the city's greening program that can be replicated by other LGUs. The three (3) areas selected as sites for the implementation of the program are the Quezon Memorial Circle, La Mesa Watershed and the NAPWC. The following table shows the actual number of flora and fauna (bats and birds only) in QMC and La Mesa Watershed.

*Table En-16_*: **Number of Flora and Fauna in Quezon Memorial Circle and La Mesa Watershed: 2018**

Area	Flora		Fauna			
			Bats		Birds	
	Species Identified	Individual Count	Species Identified	Individual Count	Species Identified	Individual Count
QMC	42	204	3	47	10	40
La Mesa Watershed	46	279	2	77	27	180

**Tagged in August – September 2018 during Phase 1 of the Program* *Source: BMB-DENR*

Programs/Projects

- **Quezon City Biodiversity Profiling –**The Quezon City Biodiversity Profiling aims to develop a database of tree inventories in the parks and open spaces in the City. Aside from the identification of tree species, the Project includes geo-tagging fieldwork with the use of a handheld Global Positioning System (GPS) to get the exact locations of trees. Maps were also generated using

Geographic Information Systems (GIS) software. The Special Projects on Climate Change of the EPWMD is in charge of tagging of trees located in public parks and schools. For the period 2016-2018, trees tagged number to 31,893.

- **Gabriela Silang Ecological Park –** To lessen the heat island effect that may be caused by the numerous infrastructures within the Quezon City Hall compound, the EPWMD in coordination with the City Architect Department, City Engineering Office and Parks Development and Administration Department, established the Gabriela Silang Ecological Park at the northeastern corner of the city hall compound. The park was inaugurated in December 2018 and features an urban garden, vertical garden, aviary and rainwater harvesting component, among others.

- **Museum of Philippine Biodiversity** - A Biodiversity museum to be located at the Ninoy Aquino Parks and Wildlife Center in Quezon City envisioned to be an instrument for people to appreciate the natural bounty of our country, realize the effects of our exploitative practices, and hopefully be engaged in efforts to rehabilitate and preserve what is left of our protected areas and biodiversity.