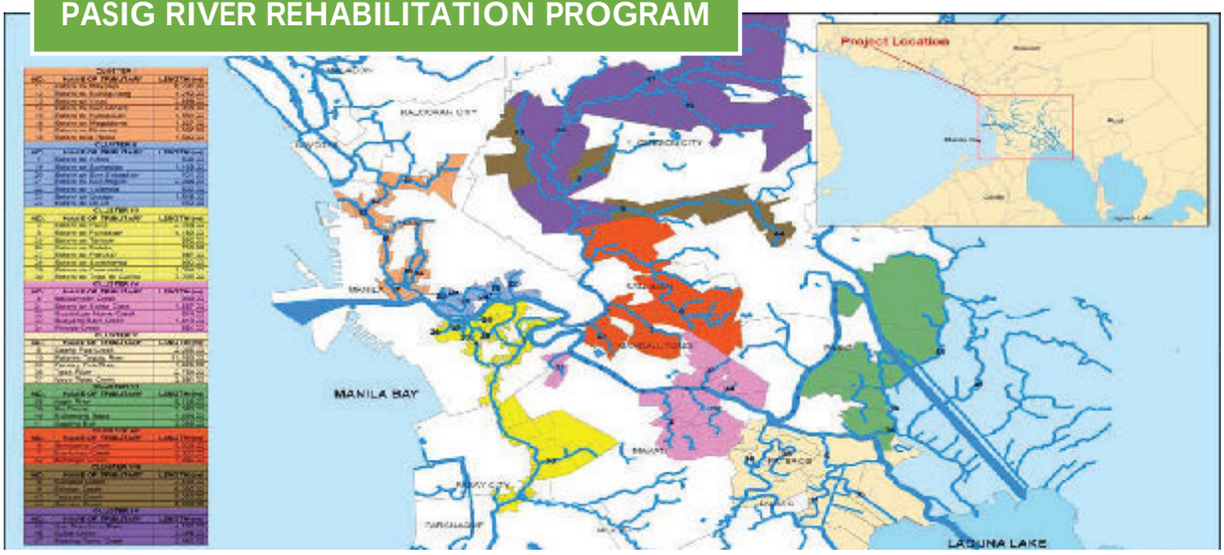
PASIG RIVER REHABILITATION PROGRAM



The Department of Environment and Natural Resources (DENR) is designated as the lead agency in the implementation of the Manila Bay Rehabilitation Program and shall carry out all measures for the water quality improvement in Manila Bay and its major river systems and tributaries, including the Pasig River. Meanwhile, through the issuance of the DENR Administrative Order No. 2020-02, the Pasig River Coordinating and Management Office (PRCMO) was created to ensure the continuity of the plans and programs of the rehabilitation and development of the Pasig River System relative to the Manila Bay Rehabilitation Program.

The Pasig River Rehabilitation Program aims to sustain rehabilitation efforts as well as improve water quality of the Pasig River System conducive to propagation of aquatic life, transportation, and tourism. Pasig River was identified as one of the priority water bodies in the Philippine Development Plan 2017-2022 (Chapter 20 Ensuring Ecological Integrity, Clean, and Healthy Environment Subsector Outcome 2 Improved Environmental Quality). The Pasig River System is composed of three (3) major tributaries namely, San Juan River, Marikina River, and Napindan River, and forty-seven (47) minor tributaries such as creeks and esteros.

Among the key programs, activities, and projects of PRCMO are the following: 1) regular monitoring of waterways to ensure that floating solid wastes and other debris are collected to prevent them from ending up on Manila Bay; 2) regular ambient water sampling activities to monitor water quality of the Pasig River and its tributaries as well as the sampling of effluent or wastewater discharge from establishments within the Pasig River System; 3) application of water quality improvement technologies; and 4) monitoring and enforcement of legal easements.

Further, the PRCMO serves as the Secretariat of the Inter-Agency Committee or the Technical Working Group (TWG) of the Pasig River Ferry Convergence Program (PRFCP), since the DENR is the lead agency/department of the said convergence program.

Water Quality and Waste Management

PRCMO signed a Memorandum of Agreement (MOA) with the Environmental Management Bureau – Central Office (EMB-CO) for the laboratory analysis of Pasig River samples. Under the agreement, EMB-CO through its Environmental Research and Laboratory Services Division (ERLSD) will accept and analyze the samples that will be submitted by PRCMO and will likewise facilitate the release of the results of the analyses and other pertinent data, as well as provide other forms of assistance during sampling activities.

Figure 2.1 MOA Signing with the Environmental Management Bureau – Central Office (EMB-CO)

Pasig River Unified Monitoring Stations

The Pasig River Unified Monitoring Stations (PRUMS) program is an inter-agency initiative to harmonize the water quality monitoring stations and data in the Pasig River System as well as to provide a coherent water quality report for public information. The data acquired in this program could be used as a decision-making tool for the formulation of strategic rehabilitation plans.

Monthly collection of water samples and measurement of in-situ water quality parameters as well as biannual collection of sediment samples are performed in 19 stations.

Indicated below are the parameters that have passed and failed in accordance to DAO No. 2016-08 based on the obtained results for the CY 2020 PRUMS water quality monitoring:

Table 3. *Stations in the Main Pasig River (PRUMS)*

STATIONS	PASSED	FAILED	REMARKS
Napindan (C6 Bridge)	BOD, DO, TSS, Nitrate, Color, pH, Chromium VI, Mercury, Cyanide, Oil and Grease, Phenols, Arsenic, Cadmium, Copper, Lead	Fecal coliform, Chloride, Phosphate, Temperature, Surfactants, Ammonia	15 Parameters have passed the DAO 2016-08 Class C guideline
Bambang Bridge	TSS, Nitrate, Color, pH, Chromium VI , Mercury, Cyanide, Oil and Grease, Surfactants, Phenols, Cadmium, Copper, Lead	BOD, DO, Fecal coliform, Chloride, Phosphate, Temperature, Ammonia, Arsenic	13 Parameters have passed the DAO 2016-08 Class C guideline
Guadalupe Ferry	TSS, Nitrate, Color, pH, Chromium VI, Mercury, Cyanide, Oil and Grease, Surfactants, Phenols, Arsenic, Cadmium, Copper, Lead	BOD, DO, Fecal coliform, Chloride, Phosphate, Temperature, Ammonia	14 Parameters have passed the DAO 2016-08 Class C guideline
Lambingan Bridge	Chloride, TSS, Nitrate, Color, Temperature, pH, Chromium VI, Mercury, Cyanide, Oil and Grease, Surfactants, Phenols, Arsenic, Cadmium, Copper, Lead	BOD, DO, Fecal coliform, Phosphate, Ammonia	16 Parameters have passed the DAO 2016-08 Class C guideline
Nagtahan Bridge	TSS, Nitrate, Color, pH, Chromium VI, Mercury, Oil and Grease, Surfactants, Cyanide, Phenols, Arsenic, Cadmium, Copper, Lead	BOD, DO, Fecal coliform, Chloride, Phosphate, Temperature, Ammonia	14 Parameters have passed the DAO 2016-08 Class C guideline
Jones Bridge	DO, TSS, Nitrate, Color, pH, Chromium VI, Mercury, Surfactants, Oil and Grease, Phenols, Arsenic, Cadmium, Copper, Lead	BOD, Fecal coliform, Chloride, Phosphate, Temperature, Cyanide, Ammonia	14 Parameters have passed the DAO 2016-08 Class C guideline

Table 4. *Stations in Major Tributaries (PRUMS)*

STATIONS	PASSED	FAILED	REMARKS
Batasan Bridge (Marikina River)	Chloride, TSS, Nitrate, Color, Chromium VI, Mercury, Cyanide, Oil and Grease, Phenols, Arsenic, Cadmium , Copper, Lead	BOD, DO, Fecal coliform, Phosphate, Surfactants, Ammonia	13 Parameters have passed the DAO 2016-08 Class C guideline
Tumana Bridge (Marikina River)	Chloride, TSS, Nitrate, Color, Temperature, pH, Chromium VI, Mercury, Oil and Grease, Cyanide, Surfactants, Phenols, Cadmium, Copper, Lead	BOD, DO, Fecal coliform, Phosphate, Ammonia, Arsenic	15 Parameters have passed the DAO 2016-08 Class C guideline
Marikina Bridge (Marikina River)	Chloride, TSS, Nitrate, Color, pH, Chromium VI, Mercury, Cyanide, Surfactants, Oil and Grease, Phenols, Cadmium, Copper, Lead	BOD, DO, Fecal coliform, Phosphate, Temperature, Ammonia, Arsenic	14 Parameters have passed the DAO 2016-08 Class C guideline

Rosario Bridge (Marikina River)	Chloride, TSS, Nitrate, Color, Chromium VI, Mercury, Cyanide, Surfactants, Oil and Grease, Phenols, Arsenic, Cadmium, Copper, Lead	BOD, DO, Fecal coliform, Phosphate, Ammonia	14 Parameters have passed the DAO 2016-08 Class C guideline
Santa Rosa Bridge (Marikina River)	DO, TSS, Nitrate, Color, Chromium VI, Mercury, Cyanide, Surfactants, Phenols, Arsenic, Cadmium, Copper, Lead	BOD, Fecal coliform, Chloride, Phosphate, Oil and Grease, Ammonia	13 Parameters have passed the DAO 2016-08 Class C guideline
Santa Ana Bridge (Taguig-Pateros River)	Chloride, TSS, Nitrate, Color, pH, Chromium VI, Mercury, Surfactants, Phenols, Arsenic, Cadmium, Copper, Lead	BOD, DO, Fecal coliform, Phosphate, Temperature, Cyanide, Oil and Grease, Ammonia	13 Parameters have passed the DAO 2016-08 Class C guideline
Levi Mariano Bridge (Taguig-Pateros River)	Chloride, TSS, Nitrate, Color, pH, Chromium VI, Mercury, Oil and Grease, Phenols, Arsenic, Cadmium, Copper, Lead	BOD, DO, Fecal coliform, Phosphate, Temperature, Cyanide, Surfactants, Ammonia	13 Parameters have passed the DAO 2016-08 Class C guideline
Buting Bridge (Taguig-Pateros River)	Chloride, TSS, Nitrate, Color, Temperature, pH, Chromium VI, Mercury, Phenols, Cadmium, Copper, Lead	BOD, DO, Fecal coliform, Phosphate, Cyanide, Oil and Grease, Surfactants, Ammonia, Arsenic	12 Parameters have passed the DAO 2016-08 Class C guideline
Sevilla Bridge (San Juan River)	Chloride, TSS, Nitrate, Color, Temperature, pH, Chromium VI, Oil and Grease, Mercury, Phenols, Arsenic, Cadmium, Copper, Lead	BOD, DO, Fecal coliform, Phosphate, Cyanide, Surfactants, Ammonia	14 Parameters have passed the DAO 2016-08 Class C guideline

Table 5. *Manila Bay Station*

STATIONS	PASSED	FAILED	REMARKS
Manila Bay	Nitrate, Color, Chromium VI, Mercury, Surfactants, Cadmium, Copper, Lead	DO, Fecal coliform, TSS, Phosphate, Temperature, pH, Cyanide, Oil and Grease, Ammonia, Arsenic	8 Parameters have have passed the DAO 2016-08 Class C guideline

(Source: PRCMO 2020 Annual Report)

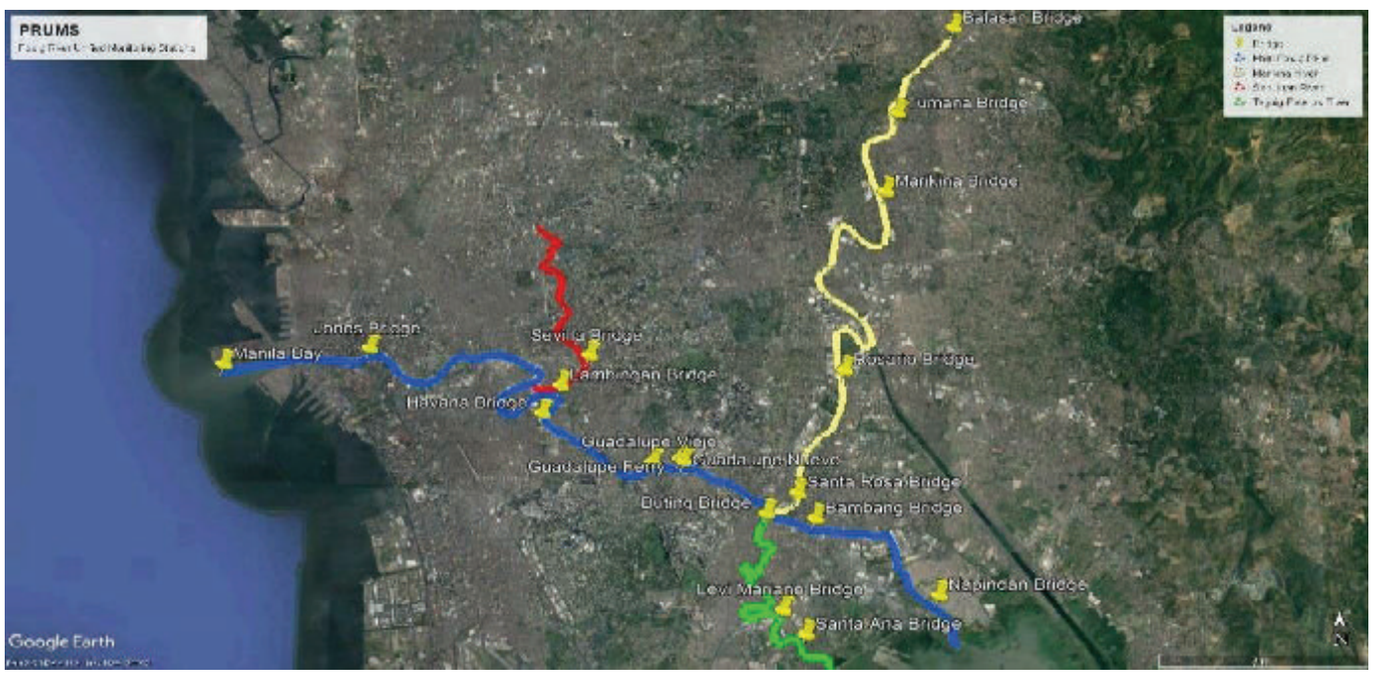


Figure 2.2 Map of the Pasig River Unified Monitoring Stations (PRUMS)

Figure 2.3 Water and sediment sampling activities conducted in Stations in main Pasig River and minor tributaries

Water Quality Monitoring for the Forty-Seven (47) Minor Tributaries

The Pasig River has 47 identified tributaries grouped into nine (9) clusters located within the cities of Manila, Marikina, Pateros, Quezon City, San Juan, and Taguig. The monitoring of these waterways is conducted to determine the improvement or deterioration of their water quality. Further, the data will serve as a planning reference in the development of each tributary.

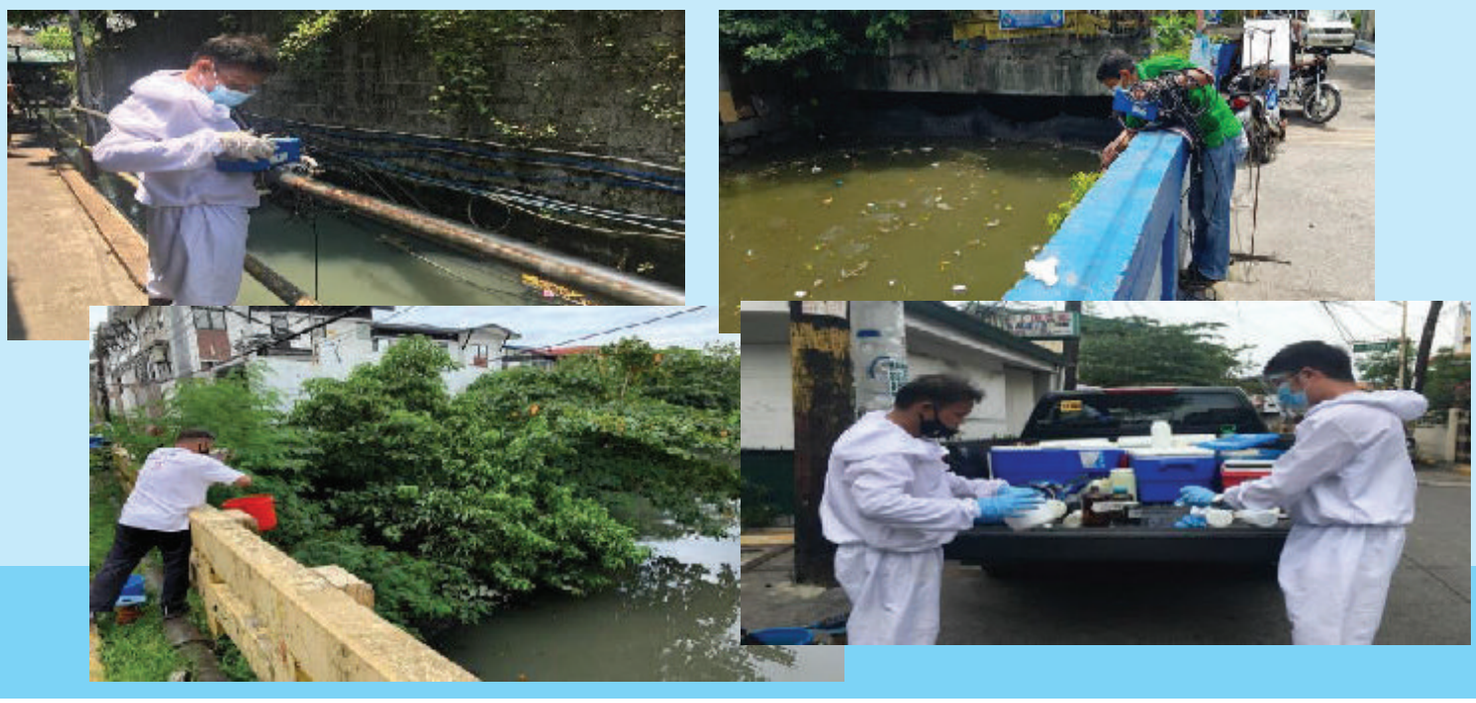


Figure 2.4 Water Quality Monitoring at some Cluster Tributaries

Table 6 below shows the 10 tributaries with the highest BOD level while Table 7 presents the 10 tributaries with the highest fecal coliform count.

Table 6. Pasig River tributaries with highest BOD level

	TRIBUTARY	BOD LEVEL (MG/L)
1	Buhangin Creek	203.00
2	Maytunas Creek	185.67
3	Estero de Santa Clara	146.33
4	Panday Pira Creek	140.00
5	Talayan Creek	135.50
6	Estero de Binondo	118.00
	Guadalupe Nuevo Creek	118.00
7	Estero de Kabulusan	112.50
8	Estero de Valencia	97.00
9	Mariblo Creek	95.00
10	Estero de San Lazaro	90.00

Table 7. Pasig River tributaries with highest fecal coliform

	TRIBUTARY	FECAL COLIFORM COUNT (MPN/100ML)
1	Estero de San Lazaro	5,346,666,666.67
2	Estero dela Reina	1,170,533,333.33
3	Estero de Maypajo	1,080,333,333.33
4	Estero de Vitas	151,733,333.33
5	Culiat Creek	50,800,000.00
6	Estero de Santa Clara	49,666,666.67
7	Guadalupe Nuevo Creek	36,333,333.33
8	Estero de Kabulusan	35,000,000.00
9	Estero de Pandacan	33,520,000.00
10	Talayan Creek	29,700,000.00

Pasig River Coordinating and Management Office-Laguna Lake Development Authority Deputation Program

The DENR-PRCMO signed a Memorandum of Cooperation (MOC) with the LLDA on February 7, 2020 to strengthen their partnership in addressing the water pollution especially in the Pasig River System. The MOC authorizes DENR-PRCMO Deputized Environmental Officers (DEOs) to enter and inspect commercial and industrial establishments to identify the type of pollution source and control facilities, as well as compliance of pertinent documents related to the requirements of LLDA within its jurisdiction (i.e. cities of Taguig, Pasig, Quezon, Manila, and Marikina, and Municipalities of Taytay, Rizal, and Pateros). In case the water pollution is very evident and the need for water sampling is required, the LLDA inspector will accompany the DENR-PRCMO DEOs. The data gathered during the deputation activity were consolidated and endorsed to LLDA for their appropriate actions. The DENR-PRCMO continuously monitors the compliance of the establishments with the environmental standards, such as securing LLDA Clearance (LC) and Discharge Permit (DP), etc.

Figure 2.5 MOC Signing last February 7, 2020

Survey and saturation activities by the DEOs of DENR-PRCMO are conducted to identify industrial and commercial establishments located along the Pasig River System and determine if these establishments have LLDA Clearance and Discharge Permit. A total of 512 industries and establishments were surveyed and saturated for CY 2020, out of the 500 target establishments. Special inspections or joint inspections were also conducted with LLDA and other agencies should there be incidents and complaints of illegal wastewater discharge. In CY 2020, the LLDA received a letter from MMDA regarding complaints of foul odor from the Pasig River ferry passengers.

Figure 2.6 Conduct of Survey and Saturation (top) and conduct of Joint Inspection with MMDA and LLDA (bottom)

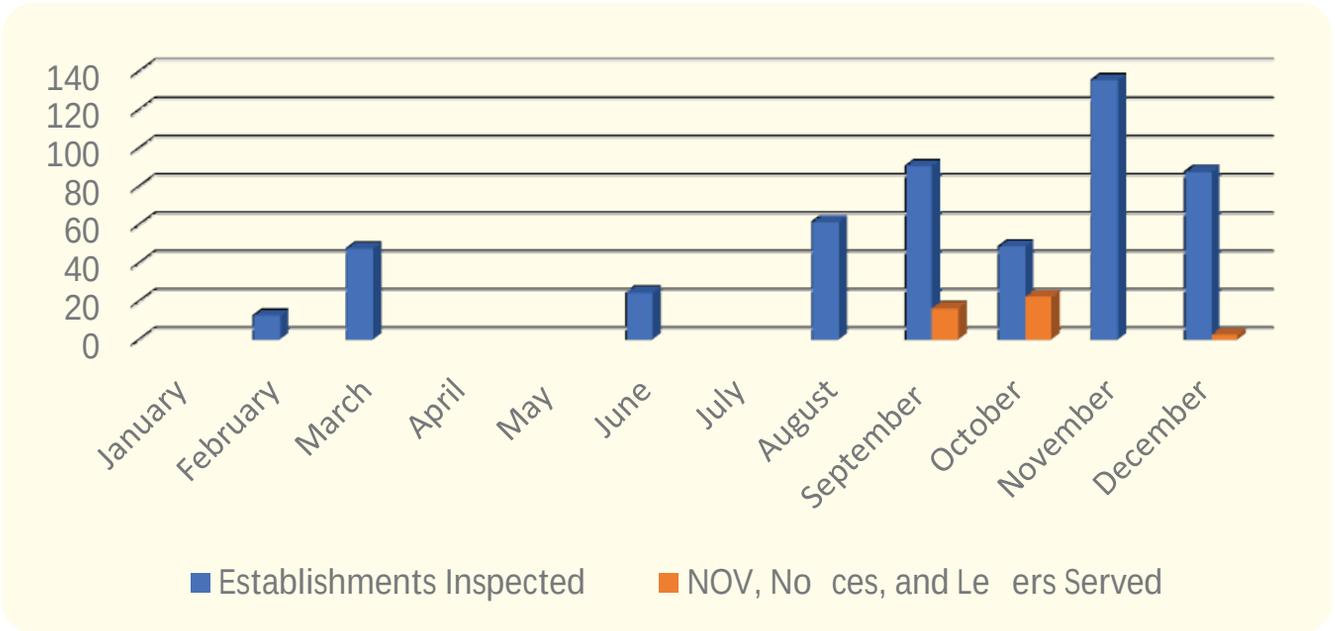


Figure 2.7 Summary of 2020 Deputation Program

Application of Water Quality Improvement Technology

The DENR-PRCMO continuously explores different emerging technologies for the water quality improvement of the Pasig River's priority tributaries which are effective and sustainable to further strengthen its rehabilitation programs and initiatives. One of these technologies is bioremediation which involves microbes to facilitate removal or neutralization of pollutants from a contaminated site. For CY 2020, the DENR-PRCMO implements pilot bioremediation project in Estero de Magdalena to improve its water quality specifically in terms of reduction of Biochemical Oxygen Demand (BOD), fecal coliform, color, and Total Suspended Solids (TSS) through the application of Bio-Solution. In addition, the project aims to reduce the foul odor emitted from the waterway. Figure 2.8 shows the results of the bioremediation project.

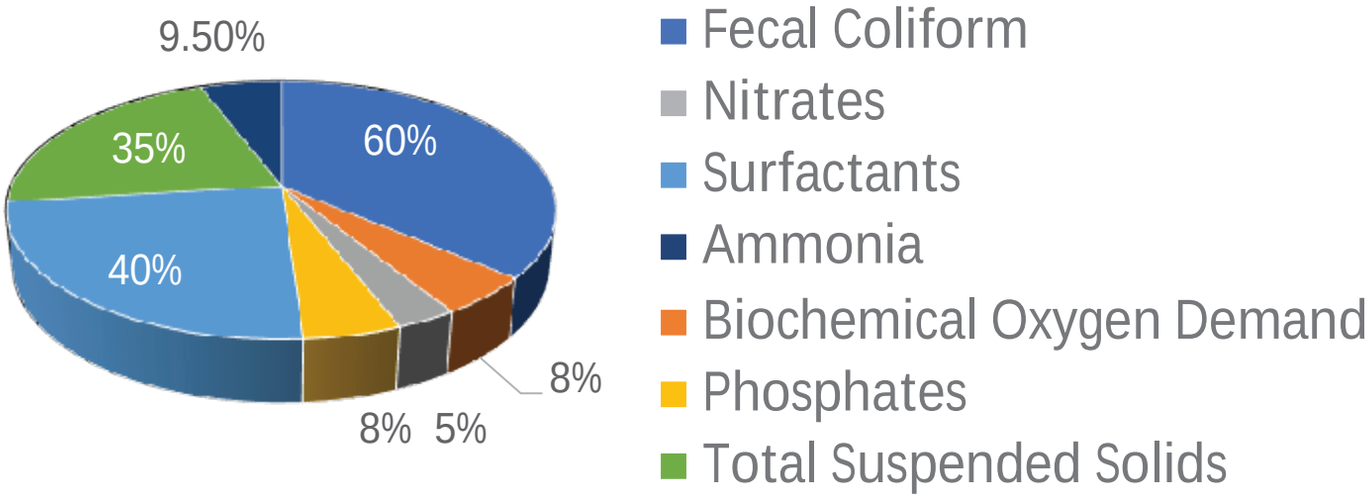


Figure 2.8 Results in percentage of the bioremediation project

Figure 2.9 Application of Bio-Solution in Estero de Magdalena (Stations of La Torre, Mayhaligue and CM Recto)

Water Hyacinth Proliferation Study

The DENR-PRCMO monitors various seasonal phenomena observed in the Pasig River system since they also have an effect on the overall water quality of the river. It includes monitoring of the water hyacinth proliferation, occurrence of algal bloom, salt water intrusion, fish tissue analysis, fish kill incidents, waste direction flow analysis etc.

Last July 2020, DENR-PRCMO conducted a water hyacinth proliferation study to determine the extent of water hyacinth proliferation in the Pasig River System and to provide recommendations as well as measures to control its rampant proliferation. Based on the observations from the conducted inspections, most waterways near Laguna Lake have widespread proliferation with clustered water hyacinth covering the whole waterway. These stations include Napindan Station, Tapayan Pumping Station, Bambang Ni Peles Station, Tipas Pumping Station, and Levi Mariano Station. Meanwhile, few to several clustered water hyacinths were seen in the middle and downstream stations of the main Pasig River. Mechanical removal of water hyacinth in larger waterways, installation of designed traps, continuous manual removal of water hyacinth in shallow waterways, as well as utilization of collected water hyacinth for livelihood programs are the recommended programs and initiatives to control the water hyacinth proliferation in the Pasig River System.

Figure 2.10 Map of Water Hyacinth Proliferation in the Pasig River System

Figure 2.11 Water Hyacinth Proliferation (Several clustered water hyacinths)

Environmental Enforcement Monitoring and Clean-up Operations

The PRCMO, through its Environmental Enforcement Division (EED), deploys Environmental Aides (EAs) known as "River Warriors" and "River Patrols" to maintain the Pasig River System free from solid wastes and other floating debris through regular and special clean-up operations. The River Warriors are deployed in minor tributaries of the Pasig River System, such as esteros and creeks, to ensure that established linear parks and the waterways are free from obstruction and solid wastes, and in other priority areas like BASECO and PAROLA.

Figure 2.12 Several Images of Clean-up Operations

Figure 2.13 Hauling of collected wastes; The collected solid wastes from the waterways and the easements were placed on sacks and transported by the Environmental Aides to the designated pick-up points for hauling services and disposal. Hauling and disposal of the retrieved floating solid wastes from the waterways were continuous despite a few delays due to the quarantine imposed in Metro Manila. Coordination and partnerships with the Local Government Units (LGUs) within the Pasig River System such as the Manila City Department of Public Services (DPS) and the City Environmental Offices of Mandaluyong, San Juan, Caloocan and Quezon City were forged to ensure the regular hauling and disposal of the collected solid wastes. This is part of the LGUs' role in the prevention and control of water pollution, water quality protection and rehabilitation of the Manila Bay Region as stated in the Administrative Order No. 16 "Expediting the Rehabilitation and Restoration of the Coastal and Marine Ecosystem of the Manila Bay and Creating the Manila Bay Task Force". Special coordination with the Metropolitan Manila Development Authority (MMDA) was also done to augment the hauling of solid wastes especially in areas where large volume of solid waste is collected (i.e. San Juan River and Tripa de Galina).

Pasig River Ferry Convergence Program

The Pasig River Ferry Convergence Program (PRFCP) was initiated and chaired by the DBM in 2017. Whereas, on November 29, 2019, National Budget Memorandum No. 113 identified the DENR as the lead department/agency for the PRFCP. The PRFCP is a multi-sectoral approach that aims to re-establish the Pasig River Ferry Service for commuter transport and disaster response, as well as organize and streamline the Government's efforts towards the rehabilitation of the Pasig River System. It aims to improve the existing Pasig River Ferry System, focusing on the intra-city connectivity within Metropolitan Manila to help mitigate traffic congestion and air pollution. Moreover, it aims to establish more ferry terminals along the existing route, as well as expand the service to Manila Bay and Laguna Lake areas to improve regional connectivity.

The PRFCP has five (5) interlinked and integrated components, to wit:

1. Fleet Acquisition and Network Development, which involves procurement of new vessels and equipment to upgrade the ferry system to modern standards and ensure adherence to passenger safety requirements and improved monitoring and enforcement system;
2. Infrastructure, which consists of repairs and construction of relevant structures, roadways, easements, and pathways required to achieve wider accessibility and intermodal connectivity of the ferry system;
3. Environmental Management, which involves the effective reduction of solid waste and water hyacinth, as well as the dredging of waterways to ensure safe and efficient navigability for the ferry system;
4. Communications, which involves information dissemination and promotion of the ferry service to commuters and tourists, and the engagement of the local communities in the project areas; and,
5. Easement Recovery, which involves the enforcement of Article 51 of Presidential Decree No. 1067 such as, but not limited to, the recovery from encroachments of the legal easement of waterways, the resettlement of informal settler families, and the dismantling of informal settlements and privately-owned structures affected by the easement development program.

(Source: PRCMO)