

Water Quality Guidelines and Effluent Standards and its Implementation in the Philippines

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Outline of Presentation

- Overview of the Water Quality Guidelines (WQG) and General Effluent Standards (GES) for water environment
- Status of Implementation of those Standards
- Status of effluent emission load from municipal waste water in Metro Manila
- Status of coordination with the plans to develop waste water treatment system
- Issues and challenges of the water environment legislation

Overview of the Water Quality Guidelines (WQG) and General Effluent Standards (GES) for Water Environment

Basic Policy

The Basic policy was taken from RA 9275 otherwise known as the Philippine Clean Water Act which declared that the state shall pursue a policy of economic growth in a manner consistent with the protection, preservation and revival of the quality of fresh, brackish and marine waters.

Scope and Coverage of the WQG

- ▶ The WQG applies to all water bodies in the country (freshwaters, marine waters, and ground water)
- ▶ Shall be used for classifying water bodies
- ▶ Shall be used for determining trends and evaluation of stages of deterioration or enhancement in water quality
- ▶ used as basis for taking positive actions in preventing, controlling or abating water pollution
- ▶ Shall be used in the Designation of Water Quality Management Area (WQMA)

Scope and Coverage of the GES

- ▶ GES applies to all point sources of pollution, regardless of volume, that discharge to receiving body of water or land and be used regardless of the industry category.
- ▶ However, Effluent used for irrigation and agricultural purposes shall conform to the guideline set by the Department of Agriculture for the safe re-use of wastewater for the purposes of irrigation and other agricultural Uses.

Scope and Coverage of the GES

- ▶ The GES established the Significant Effluent Quality Parameters per sector (industries shall only be required to monitor effluent quality parameters determined significant to them
- ▶ In consideration for establishments with influent BOD greater than or equal to 3000 mg/l, separate effluent standards were set but applicable only for establishments discharging to Class S, Class D, Class SC and Class SD water bodies.

Modification of WQG and GES

- ▶ Modification can be requested as long as a clear and scientifically valid evidence to demonstrate that such modification is consistent with RA 9275 and Implementing Rules and Regulations is provided:
 - ▶ Designated Uses
 - ▶ WQG Values
 - ▶ Significant Effluent Water Quality Parameters per Sector and GES Values

Grace Period

- ▶ Consistent with the Clean Water Act, a grace period of not more than five (5) years is provided in cases wherein:
 - ▶ Values for GES have become stringent compared to the values in DAO 1990-35 (the amended effluent standards) In such cases DAO 1990-35 shall apply during the grace period
 - ▶ Grace period can only be given to establishments that submit Compliance Action Plan and periodic status of implementation to the DENR on the steps taken for the establishments compliance schedule within the prescribed grace period.

Fines, Damages and Penalties

- ❑ Fines of 10,000 – 200,000 Php for every day of violation; upon PAB recommendation (rates to be increased 10% every 2 years);
- ❑ Closure, suspension of development or construction or cessation of operations, upon PAB recommendation;
- ❑ 2 to 4 yr imprisonment for failure to clean up & 50,000 – 100,000 for every day of violation;

Water Body Classification and Usage of freshwater

Classification Intended Beneficial use

Class AA Public Water Supply Class I. Intended primarily for waters having watersheds, which are uninhabited and/or otherwise declared as protected areas, and which require only approved disinfection to meet the latest PNSDW

Class A Public Water Supply Class II. Intended as sources of water supply that will require conventional treatment (coagulation, sedimentation, filtration and disinfection) in order to meet the PNSDW.

Class B Recreational water Class I. Intended for primary contact recreation (bathing, swimming, etc.)

- Class C
- 1) Fishery water for the propagation and growth of fish and other aquatic resources;
 - 2) Recreational Water Class II- For boating, fishing or similar activities
 - 3) For agriculture, irrigation, and livestock watering

Class D Navigable Waters

Water body Classification and Usage of Marine Waters

Classification Intended Beneficial use

Class SA 1) Protected Waters- Waters designated as national or local marine parks, reserves, sanctuaries, and other areas established by law (presidential Proclamation 1801 and other existing laws) and/or declared as such by appropriate government agency, LGUs, etc.

2) Fishery Water Class 1 - Suitable for shellfish harvesting for direct human consumption.

Class SB 1) Fishery Water Class 11- Water suitable for commercial propagation of shellfish and intended as spawning areas for milkfish (*Chanos chanos*) and simmila species

2) Tourism Zones - For ecotourism and recreational activities

3) Recreational Water Class I - Intended for primary contact recreation (bathing, swimming, skin diving, etc)

Water body Classification and Usage of Marine Waters

Classification Intended Beneficial use

Class SC 1) Fishery Water Class 11I -(For the propagation and growth of fish and other aquatic resources and intended for Commercial and sustenance fishing

2) Recreational water Class 11- For boating. Fishing, or similar activities

3) Marshy and /or mangrove areas declared as fish and wildlife sanctuaries

Class SD Navigable Waters

Water Quality Guidelines for Primary Parameters

Parameter	Unit	AA	A	B	C	D
BOD	mg/L	1	3	5	7	15
Chloride	mg/L	250	250	250	350	400
Color	TCU	5	50	50	75	150
Dissolved Oxygen (Minimun)	mg/L	5	5	5	5	2
Fecal Coliform	MPN/100ml	<1.1	<1.1	100	200	400
Nitrate as	mg/L	7	7	7	7	15
Phospate	mg/L	<0.003	0.5	0.5	0.5	5
Temperature	C	26-30	26-30	25-31	25-32	26-30
Total Suspended Solids	mg/L	25	50	65	80	110
Oil and grease	mg/L	<1	1	1	2	5

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Water Quality Guidelines for Primary Parameters

Parameter	Unit	SA	SB	SC	SD
BOD	mg/L	n/a	n/a	n/a	n/a
Chloride	mg/L	n/a	n/a	n/a	n/a
Color	TCU	5	50	75	150
Dissolved Oxygen (Minimun)	mg/L	6	6	5	2
Fecal Coliform	MPN/100ml	<1.1	100	200	400
Nitrate as NO ₃ -N	mg/L	10	10	10	15
pH(Range)		7.0-8.5	7.0-8.5	6.5-8.5	6.0-9.0
Phospate	mg/L	0.1	0.5	0.5	5
Temperature	C	26-30	26-30	25-31	25-32
Total Suspended Solids	mg/L	25	50	80	110
Oil and grease	mg/L	1	2	3	5

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Effluent Standards

Parameter	Unit	AA	A	B	C	D
Ammonia as NH3-N	mg/L	NDA	0.5	0.5	0.5	7.5
BOD	mg/L	NDA	20	30	50	120
COD	mg/L	NDA	60	60	100	200
Color	TCU	NDA	100	100	150	300
Flouride	mg/L	NDA	2	2	2	4
Nitrate as NO3-N	mg/L	NDA	14	14	14	30
pH(Range)		NDA	6.0-9.0	6.0-9.0	6.0-9.0	5.5-9.5
Phosphate	mg/L	NDA	1	1	1	10
Surfactants (MBAS)	mg/L	NDA	2	3	15	30
Total Suspended Solids	mg/L	NDA	70	85	100	150
Oil and Grease	mg/L	NDA	5	5	5	15

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Effluent Standards

Parameter	Unit	SA	SB	SC	SD	
Ammonia as NH3-N	mg/L	NDA	0.5	0.5	7.5	
BOD	mg/L	NDA	30	100	150	
COD	mg/L	NDA	2	20	80	
Color	TCU	NDA	100	150	300	
Flouride	mg/L	NDA	3	3	6	
Nitrate as NO3-N	mg/L	NDA	20	20	30	
pH(Range)		NDA	6.5-9.0	6.0-9	5.5-9.5	
Phospate	mg/L	NDA	1	1	10	
Surfactants (MBAS)	mg/L	NDA	3	15	30	
Total Suspended Solids	mg/L	NDA	70	100	150	
Oil and Grease	mg/L	NDA	5	10	15	

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Status of Implementation of the WQG and GES

Activities Undertaken:

- ▶ Classification of water bodies
- ▶ Determine trends and stages of deterioration of water quality
- ▶ Designation of Water quality management area
- ▶ As basis for taking positive actions to prevent, control and abate water pollution.

Classification of Water Bodies

Classified Water Bodies by Region

Region	Principal River	Other Rivers	Marine Waters	Lakes	Total
1	14	10	1	0	25
2	26	23	0	0	49
3	16	43	4	0	63
4A	26	29	1	2	58
4B	30	25	16	1	72
5	29	23	7	4	63
6	31	25	15	0	71
7	19	14	10	0	43
8	23	27	9	1	60
9	17	27	3	0	47
10	12	29	1	1	43
11	17	15	4	0	36
12	14	26	6	2	48
CAR	11	28	0	1	40
CARAGA	19	11	6	1	37
NCR	2	3	1	0	6
Total	306	358	84	13	761

Water Quality Monitoring and Assessment

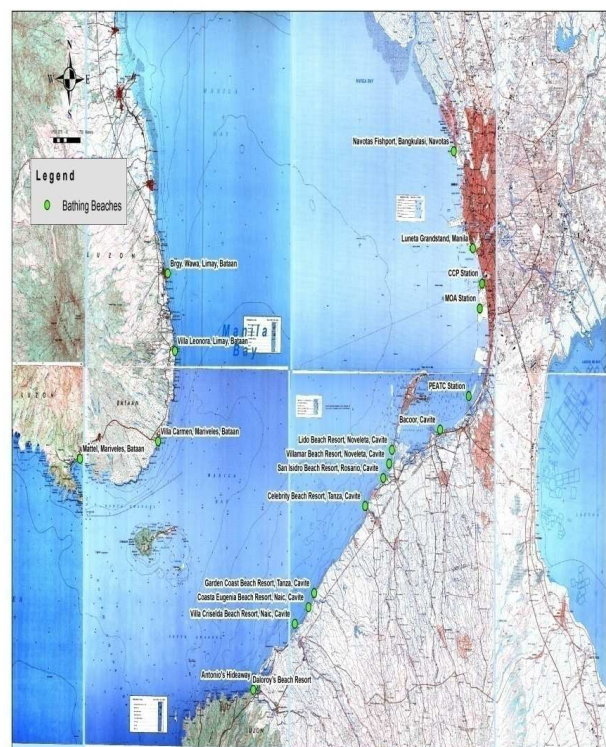
- ▶ From 2006 to 2015, EMB monitored 164 water bodies, comprising principal rivers, minor rivers, lakes and marine waters based on the set beneficial use.

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Water Quality Monitoring

Monitoring of Bathing Beaches of Manila Bay

- Nineteen (19) bathing beaches in Manila Bay were monitored for Total and Fecal Coliform, DO, pH and TSS
- Out of the nineteen (19) stations monitored only two passed the SB criteria of 1000 mpn/100 ml for total coliform
- For fecal coliform, only one (1) station passed the criteria of 200 mpn/100 ml
- Ten (10) stations passed the criteria of 5 mg/L for DO while fourteen (14) stations for pH and ten (10) stations passed the water quality criteria for TSS.

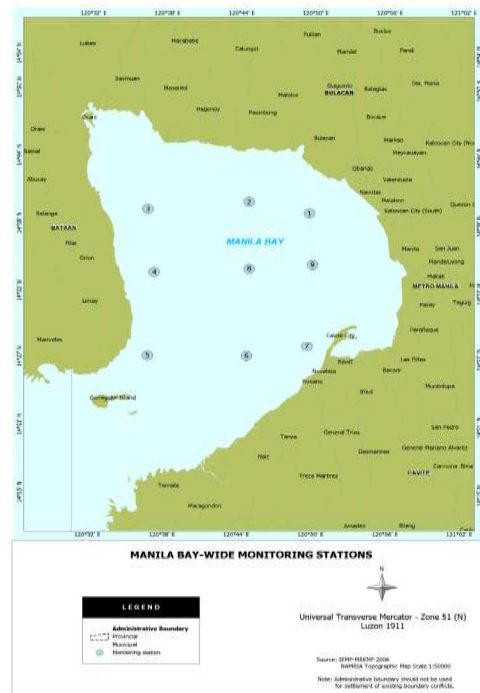


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Water Quality Monitoring

Baywide Monitoring (Offshore)

- Nine (9) stations baywide in Manila Bay were monitored for DO, pH, Salinity, Temperature, Conductivity, Phosphate and Heavy Metals.
- A decreasing trend of Dissolve Oxygen (DO) from top to bottom was observed in all stations.
- Surface DO conformed with the criteria of 5mg/L in all stations while only 8 stations conformed at mid - depth and only 1 station passed the DO criteria at the bottom.
- For TSS and Phosphate, all stations passed the criteria.
- High levels of pH ranging from 8.94 to 9.56 were observed in the bay.



Water Quality Monitoring

River Water Quality Monitoring

- Selected river systems in the Manila Bay Region (Region 4 - A, NCR and Region 3) discharging into Manila Bay were monitored to determine their compliance with the water quality criteria.



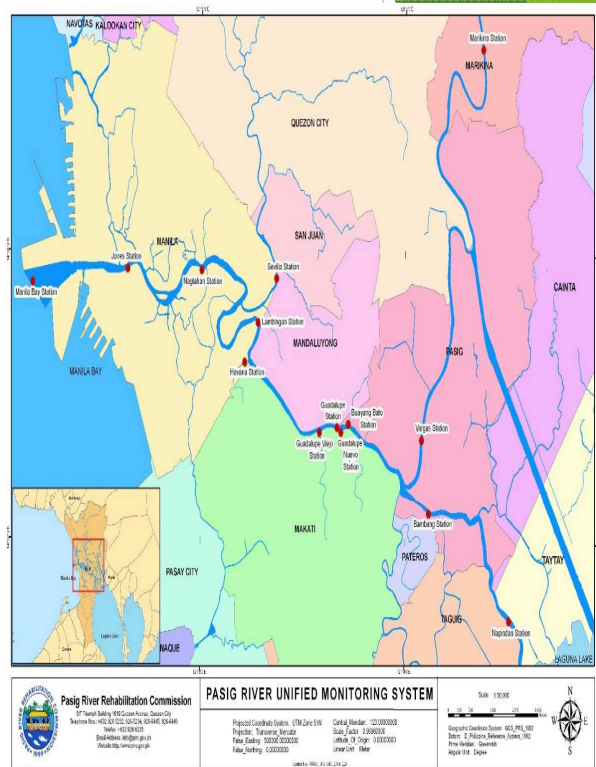
Map showing the selected river system draining into Manila Bay

Pasig River Unified Monitoring System

Fourteen (14) stations in Pasig river were monitored for DO and BOD.

Out of the 14 stations monitored only one (1) stations passed the DO criteria of 5 mg/L for Class C waters.

All stations failed the BOD criteria of 7 mg/L .



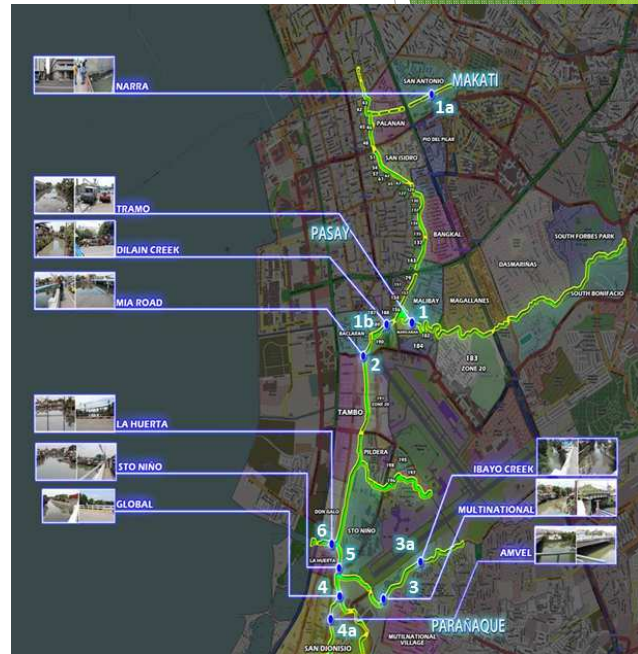
Result of Pasig River Water Quality Monitoring CY 2015

STATIONS	PARAMETERS	
	DO, mg/L	BOD, mg/L
C6 Bridge	6.1	11.33
Bambang Bridge	2.57	24.6
Vargas Bridge	0.45	52.66
Marikina Bridge	3.21	31.0
Buayang Bato	2.96	106.6
Guadalupe Ferry Station	3.75	12.0
Guadalupe Nuevo	0.2	99.33
Guadalupe Viejo	1.9	69.33
Sevilla Bridge	0.97	68.66
Lambingan Bridge	2.63	12.66
Havana Bridge	1.87	12.66
Nagtahan Bridge	1.1	11.33
Jones Bridge	3.06	13.33
Manila Bay	1.73	9.33
DENR WATER QUALITY CRITERIA	5 mg/L	10 mg/L

Water Quality Monitoring

Parañaque River System

- Ten (10) stations were monitored for DO, BOD, TSS, Phosphate and Nitrate
- DO - All Stations Failed (Criteria: 5 mg/L)
- BOD - All Stations Failed (Criteria: 7 (10) mg/L)
- TSS - 5 Stations Passed (Criteria: 50 mg/L)
- Phosphate - All Stations Failed (Criteria: 0.4 mg/L)
- Nitrate - 7 Stations Passed (Criteria: 10 mg/L)

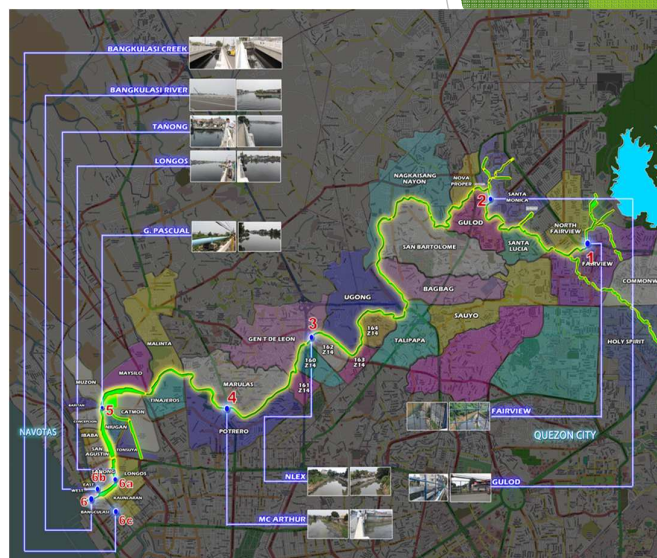


Map of Parañaque River System

Water Quality Monitoring

Navotas - Malabon - Tullahan - Tenejeros River System

- Nine (9) stations were monitored for DO, BOD, TSS, Phosphate and Nitrate
- DO - All Stations Failed (Criteria: 5 mg/L)
- BOD - All Stations Failed (Criteria: 7 (10) mg/L)
- TSS - All Stations Passed (Criteria: 50 mg/L)
- Phosphate - All Stations Failed (Criteria: 0.4 mg/L)
- Nitrate - 7 Stations Passed (Criteria: 10 mg/L)

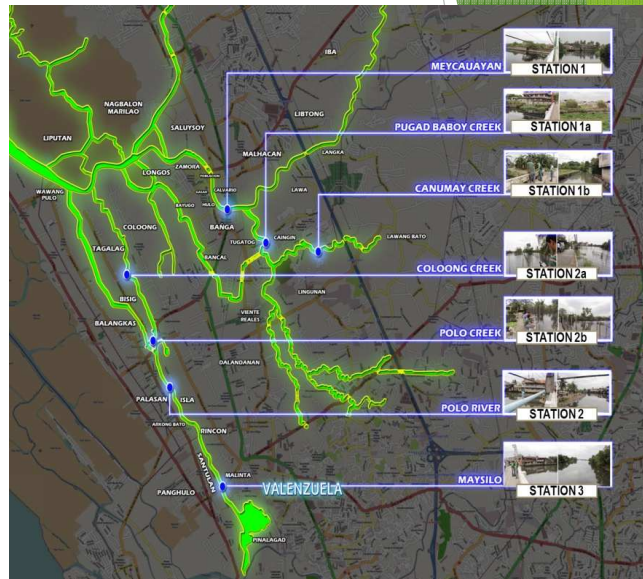


Map of Navotas - Malabon - Tullahan - Tenejeros River System

Water Quality Monitoring

Meycauayan - Valenzuela River System

- Six (6) stations were monitored for DO, BOD, TSS, Phosphate and Nitrate
- DO - All Stations Failed (Criteria: 5 mg/L)
- BOD - All Stations Failed (Criteria: 7 (10) mg/L)
- TSS - 4 Stations Passed (Criteria: 50 mg/L)
- Phosphate - All Stations Failed (Criteria: 0.4 mg/L)
- Nitrate - 4 Stations Passed (Criteria: 10 mg/L)

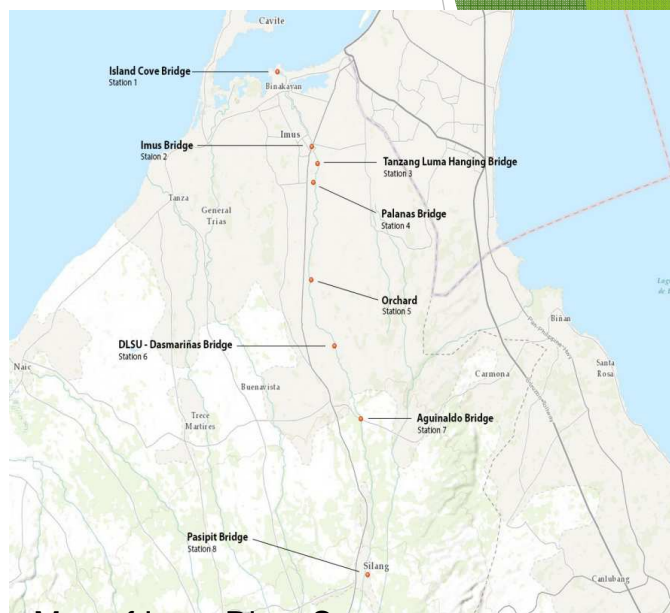


Map of Meycauayan – Valenzuela River System

Water Quality Monitoring

Imus River System

- Eight (8) stations were monitored for DO, BOD, TSS and Phosphate
- DO - 4 Stations Passed (Criteria: 5 mg/L)
- BOD - 3 Stations Passed (Criteria: 7 (10) mg/L)
- TSS - 7 Stations Passed (Criteria: 50 mg/L)
- Phosphate - All Stations Failed (Criteria: 0.4 mg/L)

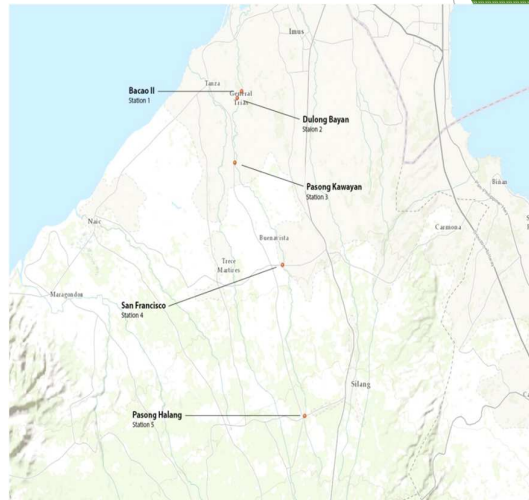


Map of Imus River System

Water Quality Monitoring

Rio Grande River System

- Five (5) stations were monitored for DO, BOD, TSS and Phosphate
- DO - 3 Stations Passed (Criteria: 5 mg/L)
- BOD - 3 Stations Passed (Criteria: 7 (10) mg/L)
- TSS - All Stations Passed (Criteria: 50 mg/L)
- Phosphate - 1 Station Failed (Criteria: 0.4 mg/L)



Map of Rio Grande River System

River Water Quality Monitoring in Region III

Table 1. Results of water quality monitoring in Region III

RIVERS MONITORED	Number of Stations Monitored	DO (5mg/L)	BOD (10mg/L)	Nitrate (10mg/L) (Applicable to Lakes and reservoirs)
Talisay River	3	All stations failed	All stations passed	All stations passed
Angat River	4	All stations failed	All stations passed	All stations passed
Sta. Maria River	3	All stations failed	All stations failed	All stations passed
Obando River	3	All stations failed	All stations failed	All stations passed
Marilao River	5	All stations failed	All stations failed	All stations passed
Bocau River	3	All stations failed	All stations failed	All stations passed
Meycauyan River	5	All stations failed	All stations failed	All stations passed
Guagua River	3	All stations failed	All stations failed	All stations passed
Pampanga River	5	All stations failed	All stations passed	All stations passed
Total	34			

Designation of Water Quality Management Area (WQMA)

- ▶ Water quality Management Area is defined as an area designated using appropriate physiographic units (watershed, river basin or water resources regions) sharing common interest or face similar development programs, prospect or problems.
- ▶ Designation of WQMA empowered the local stakeholders to institute measures and identify programs to effectively manage the water bodies in their respective area.
- ▶ Governing Board (GB) was created to develop strategies to coordinate policies, regulations and local legislation necessary for the effective implementation of the Clean Water Act
- ▶ As of 2016, EMB has Designated 31 water quality management area all over the country.

Industrial/Commercial Monitoring

Total Number of Establishments monitored within the Manila Bay Region from CY 2011 - 2015

Regions	Universe/ Baseline 9,600	2011	2012	2013	2014	2015	Total
NCR	3,800	730	738	986	377	523	3354
RIII	3,800	715	115	845	739	629	3041
RIV - A	2,000	633	132	676	461	492	2394
TOTAL	9,600	2,078	985	2,507	1,577	1644	8791

Industrial / Commercial Establishments within the Manila Bay Region with Discharge Permit from 2011 – 2015

Regions	2011	2012	2013	2014	2015	Total number of establishment with discharge permit	Total number establishment monitored	% Establishments Monitored in Compliance with the Effluent Standards
NCR	352	343	106	280	291	1372	3354	40.9%
R3	211	90	298	510	408	1517	3041	49.88%
R4A	292	108	217	317	169	1103	2394	49.06%
					Grand Total	3992	8791	45.41%

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Total BOD Loading (kg/day) of the Establishments Monitored from 2011 – 2015

Manila Bay Region	Total Number Establishment Monitored	2011	2012	2013	2014	2015	Total BOD load
NCR	3354	6265.02	4862.03	509.83	529.01	488.26	12654.15
R3	3041	2297.94	76.76	2458.90	4565.46	5342.37	14741.43
R4A	2394	2755.60	202.58	1270.66	855.67	4716.71	9801.22
Total	8791	11318.56	5141.37	4239.39	5950.14	10547.36	37196.8

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BOD Loading (kg/day) of Establishments monitored with DP from 2011 – 2015

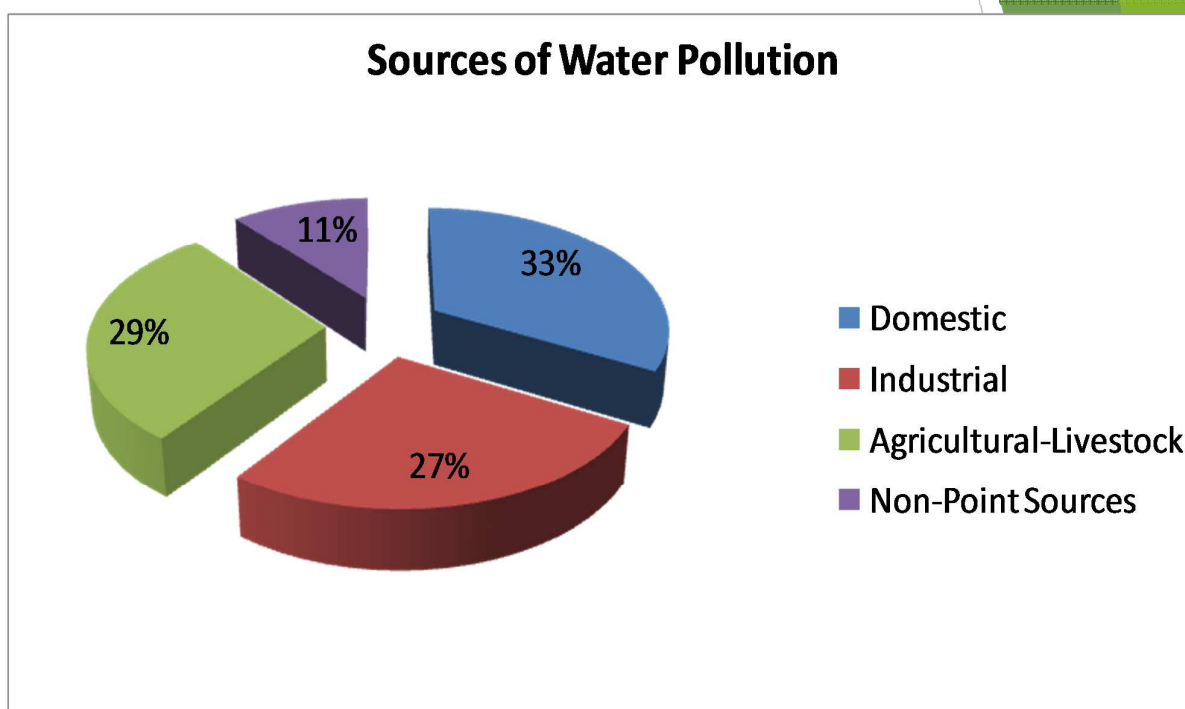
Manila Bay Region	Total Number of Industries with DP	2011 BOD Load	2012 BOD load	2013 BOD load	2014 BOD load	2015 BOD load	Total BOD load
NCR	1372	2259.85	296.62	41.31	778.74	154.8	3531.32
R3	1517	1596.19	42.44	397.02	4930.39	4650.54	11616.58
R4A	1103	1604.50	21.26	996.65	1278.48	495.93	4396.82
Total	3992	5460.54	360.32	1434.98	6987.61	5301.27	19544.72

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Sewage, Sewage Generation and Pollution Load in Metro Manila

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Status of Effluent Emission Load from Municipal Water



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Characteristics of Raw Domestic Sewage

Parameter	Central Manila ¹	Cavite ²	Valenzuela ³	Quezon City East ⁴	San Mateo ⁵	2004 Master Plan ⁶
BOD ₅ (mg/l)	42-273	38-132	123-454	5-25	6-21	150-350
COD (mg/l)	56-276	97-219	212-1004	20-43	13-51	300-700
TSS (mg/l)	15-89	7-35	25-1006	8-130	38-151	50-150
TN (mg/l)	14-81	11-40	10-144	4-36	17-93	50-60
TP (mg/l)	3-14	3-6	1-12	0.06-46	0.46-1.29	8-15
NO ₃ (mg/l)	0.1-1	0.7-1.3	0.1-8	0.2-0.45	0.15-0.48	-
O & G (mg/l)	4-58	1.6-5.1	1-6	-	-	-
NH ₄ (mg/l)	25-39	11-34	1-294	1.2-2.9	1.7-7.0	-
Total Coliform (MPN/100ml)	3x10 ⁶ - ≥16x10 ⁶	3x10 ⁶ - ≥16x10 ⁶	3x10 ⁶ - ≥16x10 ⁶	-	-	-
Fecal Coliform (MPN/100ml)	2x10 ⁶ - ≥16x10 ⁶	1.4x10 ⁶ - 11x10 ⁶	4x10 ⁶ - 16x10 ⁶	-	-	10 ⁸ -10 ⁹

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Domestic Pollution Loading in Metro Manila in Areas Covered by the Two MWSS Concessionaires

Sewage, Sewage Generation and BOD Loading (East Sector)

Year	Population	Total (cmd)	BOD Loading (kg BOD/day)	BOD Loading Treated by STP	% Actual Target
2013	6,848,161	1,193,848.03	68,040.00	10,426.00	15.32 %
2014	6,947,079	1,214,869.26	70,761.60	14,609.00	20.65 %
2015	7,047,534	1,263,438.95	73,591.20	11,877.00	16.14 %
2016	7,132,162	1,472,541.75	76,536.00	8,477.00	11.08 %

Sewage, Sewage Generation and BOD Loading (West Sector)

Year	Population	Waste Generation (cmd)	BOD Loading (kg BOD/day)	BOD Loading Treated by STP	% Actual Target
2016	9,889,165	1,423,534	58,876.80	29121.00	49.46 %
Total:	17021327	2896075.75	135412.80	37598.00	27.76 %

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Status of Coordination with the Plans to Develop Wastewater Treatment System

- ▶ The DENR as the lead agency in the implementation of the Clean Water Act and the Supreme Court Order to Clean Manila Bay, regularly call meetings with concerned agencies for the successful implementation of the said Act and the Operational Plan for the Manila bay Coastal Strategy specifically on pollution reduction issues
- ▶ The meetings/workshops discussed:
 - ▶ MWSS- Status of accomplishment in terms of sewerage and sanitation management and the Road Map for completion of waste water treatment facilities in Metro Manila.
 - ▶ LWUA- Status of sewerage and sanitation management outside Metro Manila and the No. Of LGUs and Water District with Septage Treatment Facilities

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Status of Coordination with the Plans to Develop Wastewater Treatment System

- ▶ LGUs -Projects identified for inclusion in the sewerage and septage and management program for submission to DPWH. Inventory of household and with septic tanks. Preparation of ordinance for all LGUs to have sewerage and sanitation facilities
- ▶ DPWH- Status of NSSMP and their projects with the World Bank on the provision of WTF in 17 Major cities
- ▶ NEDA-ADB - on the preparation of feasibility studies on sewerage and sanitation management for 34 municipality.
- ▶ EMB - provision of assistance to LGUs in the preparation of feasibility studies on sewerage and sanitation management in their municipality.

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Issues and Challenges on the Water Environment Legislation

- Inadequate logistical support to strictly enforce the clean water act and related laws (financial and technical)
- Inadequate capacity of the law implementers especially at the local level.
- Low awareness of the stakeholders on the existing law, rules and regulations on wastewater management
- Weak cooperation among different government agencies and Local Government Units, hence derail law enforcement
- Big investment on the part of industrial establishments to put up WTF as a results of the inclusion of additional parameters in the new effluent standard (NO₃, PO₄)

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Thank you!

