



# **Clean Water and Sanitation in Fishing**

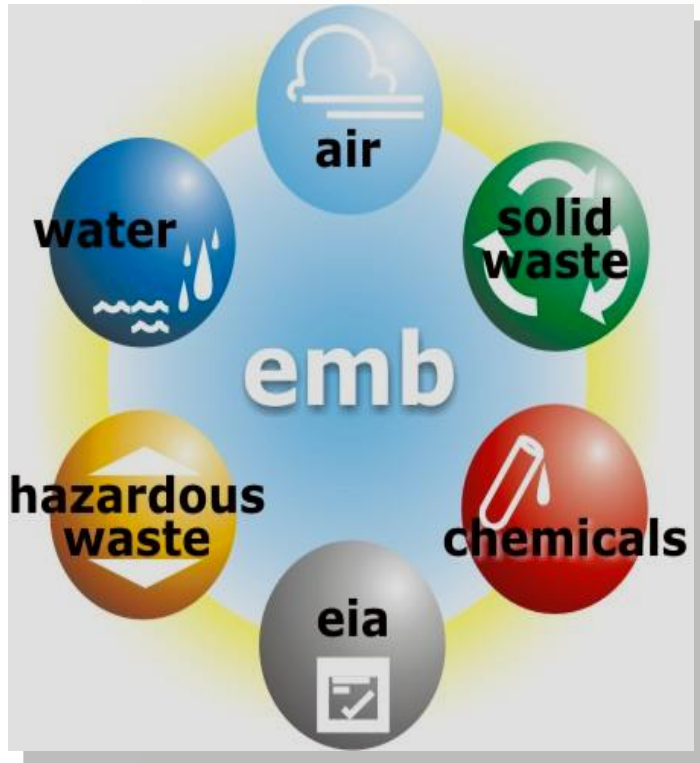
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Environmental Management Bureau

Department of Environment and Natural Resources

# EMB MANDATE

EMB was created under EO 192 and became a line Bureau by virtue of Sec. 34 of Philippine Clean Air Act of 1999. It is mandated to implement on a nationwide scale the said Act and other environmental laws to wit:



- PD 1586 (Environmental Impact Statement System of 1978)
- RA 6969 (Toxic Substances and Hazardous Waste Control Act of 1990)
- RA 8749 (Clean Air Act of 1999)
- RA 9003 (Ecological Solid Waste Management Act of 2000)
- **RA 9275 (Philippine Clean Water Act of 2004)**
- RA 9512 (Environmental Awareness Act of 2008)

EMB is also mandated to provide research and laboratory services; and serve as secretariat in the adjudication of pollution cases.

# Fishing Sector

- The fishing sector's contribution to the Gross Domestic Product amounted to **1.73 percent in 2013**, equivalent to a monetary value of **PhP 199.32 Billion** out of the total of PhP 11.54 Trillion at current price.
- Fishing sector's productivity is strongly dependent on the quality of water resources in the country.
- Fish kills can occur as a result of low dissolved oxygen levels in water, abnormal shifts in temperature or deteriorating water quality.

# Why Clean Water and Sanitation in Fishing?

- Some documented fish kills:
  - May 2011 – *Bangus* and *tilapia* production in Taal Lake was largely affected by a fish kill, estimated to have reached 800 metric tons. The fish kill was attributed to climate change, in which the abnormal shift in temperatures led to a sudden drop in the Lake's oxygen level, resulting to massive fish deaths. Later reports have also cited overcrowding of fish cages and overfeeding as other major factors leading to the incident.
  - June 2011 – A fish kill hit the waters of Bolinao and Anda in Pangasinan, where at least 10,000 metric tons of *bangus* were affected, amounting to some PhP 3 million worth of losses for the affected fish farms.
  - May 2012 – Fish kills in Rizal and Laguna were caused by the deteriorating water quality of Laguna de Bay.

# Why Clean Water and Sanitation in Fishing?



# Significant Water Quality Parameters

**Dissolved Oxygen (DO)** is the concentration of oxygen measured in its dissolved form.

- Fish and other aquatic organisms require at least 5 milligrams per liter (mg/L) of dissolved oxygen to live. A DO level that is below this value cannot sustain the growth and productivity of aquatic life.
- Some factors that affect the concentration of DO in a water body are:
  - *Water movement* – The more movement in water, the more oxygen is dissolved.
  - *Temperature* – Low temperatures can hold oxygen more than high temperatures.
  - *Pollution* – The higher the level of pollution, the lower the concentration of dissolved oxygen.

# Significant Water Quality Parameters

**Total Suspended Solids (TSS)** measures the concentration of undissolved solid particles in water, such as silt, decaying plant and animal matter, and domestic and industrial wastes.

- The higher the TSS value, the lower is the ability of the water to support aquatic life due to reduced light penetration.
- This impacts photosynthesis in aquatic plants, clogs fish gills, and increases absorption of heat that results in higher water temperatures, among others.

# Solid Wastes and Suspended Solids





# Significant Water Quality Parameters

**Phosphates** are usually found in detergents, raw sewage, and nutrient fertilizers for plants.

- The presence of excess phosphates can cause enormous algal bloom, a form of cyanobacteria, which can produce neurotoxins (affecting the nervous system) and hepatoxins (affecting the liver).
- Once a vast mass of excess algae die and decompose by oxidation, the water is depleted of dissolved oxygen and may result to fish kill.

# Significant Water Quality Parameters

**Nitrates** in the environment consist of salts of ammonium, sodium, potassium, and calcium.

- Similar to phosphates, nitrates in water bodies come from soil fertilizers during agricultural runoff as well as from sewage discharge and septic systems where they are formed as by-products of the decomposition of animal or human wastes.
- Consequently, high nitrate concentrations can inhibit the growth of fish, impair the immune system, and cause stress in some aquatic species.

# Fish Kill Due to Excessive Nutrients





# **Philippine Clean Water Act of 2004**

**Republic Act No. 9275**



**DENR Administrative Order No. 2005-10**  
**IMPLEMENTING RULES AND REGULATIONS**  
of the  
**Philippine Clean Water Act of 2004**  
(Republic Act No. 9275)










**ENVIRONMENTAL MANAGEMENT BUREAU**  
Department of Environment and Natural Resources  
2005

## **RA 9275**

**THE CLEAN WATER ACT IS A MILESTONE LEGISLATION THAT CAN DELIVER THE MUCH NEEDED SUPPORT IN OUR EFFORT TO ADDRESS WATER CONCERNS. THIS LAW CALLS FOR AN INTEGRATED, HOLISTIC, DECENTRALIZED AND PARTICIPATORY APPROACH TO ABATE, PREVENT AND CONTROL WATER POLLUTION.**

# DECLARATION OF PRINCIPLES AND POLICIES

## **RA 9275 Sec. 2. Sustainable Development Framework**

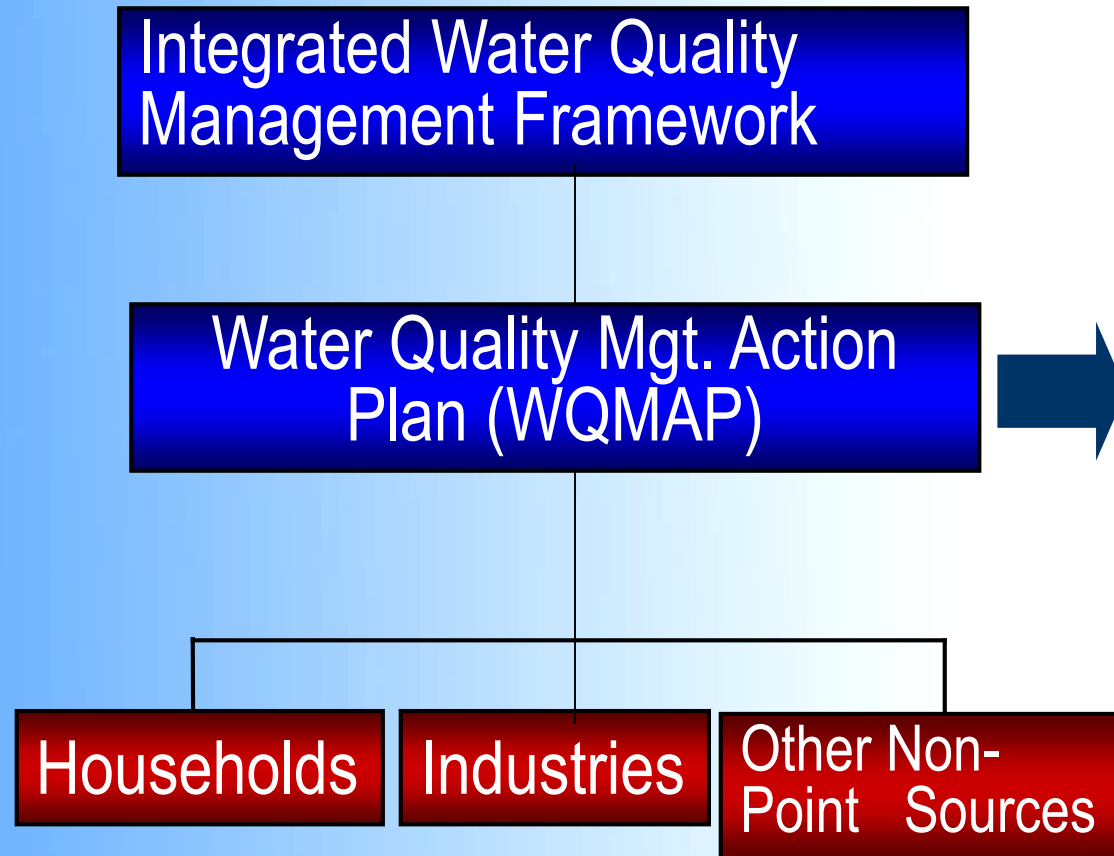
-  Holistic National Program
-  Operate under an Integrated WQ Framework
-  Self-regulation among industries thru MBIs
-  Focus on pollution prevention
-  With a system of accountability
-  Streamline procedures and processes
-  Mobilize/Encourage participation of Civil society and other sectors through education and access to information

## RA 9275 Sec. 3. Coverage

- ✓ **Water Quality Management in all water bodies**
- ✓ **Primarily apply to abatement & control of pollution from land-based sources**
- ✓ **Enforcement of Water Quality standards, regulations and penalties**



# Conceptual Framework



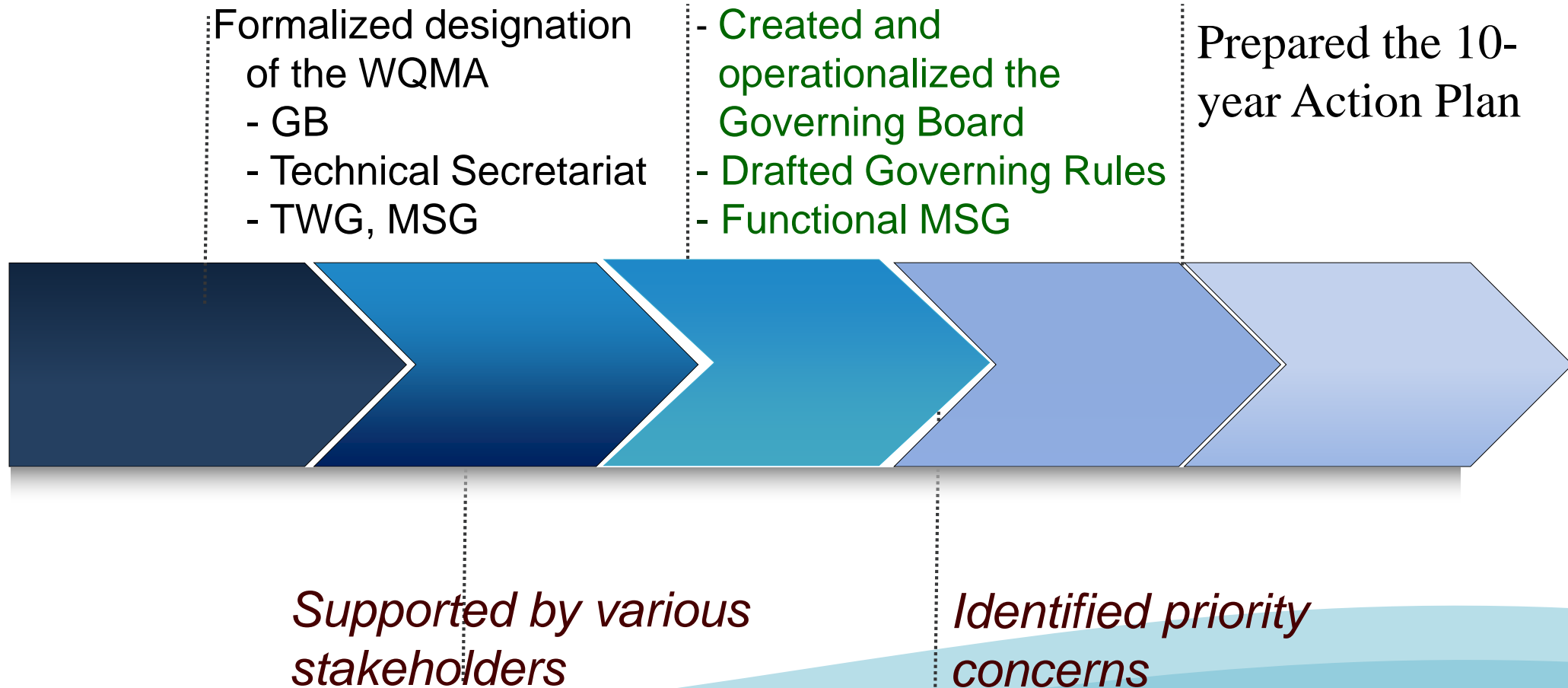
- Designation of Water Quality Management Areas (WQMA)
- Non-Attainment Areas (NAA)
- Natl. Sewerage and Septage Management Program
- Classification/ Reclassification of water bodies
- Groundwater Vulnerability Mapping
- Water Quality Guidelines
- Effluent Standards
- Categorization of Industry
- Wastewater Charge System
- Discharge Permits
- Financial Liability
- Programmatic EIA
- Incentives and Rewards
- Prohibitions/Sanctions/ Actions



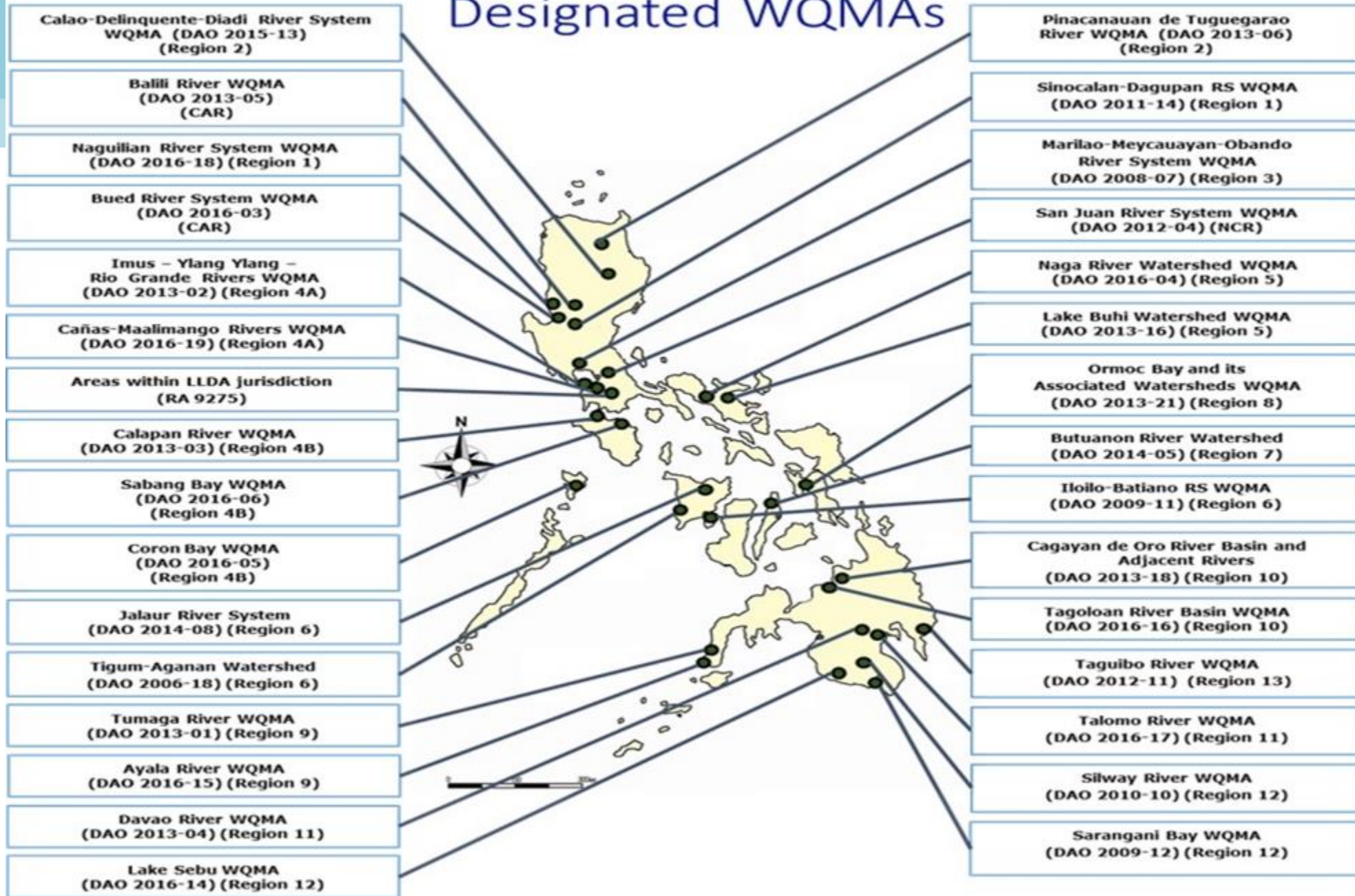
# Section 5. Water Quality Management Area

- The DENR, in coordination with National Water Resources Board (NWRB), shall designate certain areas as **water quality management areas (WQMAs)** using appropriate physiographic units such as watershed, river basins or water resources regions.
- The objective of the WQMA is to protect, thru stakeholders collaboration, the water body and its tributaries by keeping their water quality within the Water Quality Guidelines or Criteria conforming to the water body's classification (e.g., Class C or Class SC) or even improve the quality to higher classification (e.g., from C to B or SC to SB).

# WQMA Designation and Preparation of Action Plans



# Designated WQMAs



# **Section 7. National Sewerage and Septage Management Program**

- The Department of Public Works and Highways (DPWH), through its relevant attached agencies, in coordination with the DENR, local government units (LGUs) and other concerned agencies shall prepare a national program on sewerage and septage management in connection with Section 8 hereof (Domestic Sewage Collection, Treatment and Disposal).
- The national government may allot, on an annual basis, funds for the construction and rehabilitation of required facilities (Sewage/Septage Treatment Plant).

## ***Section 8. Domestic Sewage Collection, Treatment and Disposal***

- **The agency vested to provide water supply and sewerage facilities and/or concessionaires in Metro Manila and other highly urbanized cities (HUCs) as defined in Republic Act No. 7160, in coordination with LGUs, shall be required to connect the existing sewage line found in all subdivisions, condominiums, commercial centers, hotels, sports and recreational facilities, hospitals, market places, public buildings, industrial complex and other similar establishments including households to available sewerage system.**

## **Section 8. *Domestic Sewage Collection, Treatment and Disposal***

- In areas not considered as HUCs, the DPWH in coordination with the DENR, DOH and other concerned agencies, shall employ septage or combined sewerage-septage management system.

## **Section 8. *Domestic Sewage Collection, Treatment and Disposal***

Areas without concessionaires and water districts.

- In the case of HUCs, non-HUCs and LGUs where water districts and water corporations have not yet been constituted and operational, the concerned LGU shall employ septage management system or other sanitation program.

## SECTION 22. Linkage Mechanism

- DA, shall coordinate with the DENR, in the formulation of guidelines for the re-use of wastewater for irrigation and other agricultural uses and for the prevention, control and abatement of pollution from agricultural and aquaculture activities:
- Provided, That discharges coming from non-point sources be categorized and further defined pursuant to this Act: That the **Bureau of Fisheries and Aquatic Resources (BFAR) of the DA** shall be primarily responsible for the **prevention and control of water pollution** for the development, management and conservation of the **fisheries and aquatic resources**;





# Department of Environment and Natural Resources Administrative Order (DAO) No. 2016-08

**Water Quality Guidelines  
and General Effluent Standards of 2016**



# DAO 2016-08: Water Quality Guidelines and General Effluent Standards

## Basic Policy

- It is the policy of the State to pursue a policy of economic growth in a manner consistent with the protection, preservation and revival of the quality of our fresh, brackish and marine waters.

## Water Quality Guidelines

- The rules and regulations established in this section are intended to maintain and preserve the quality of all water bodies based on their intended beneficial usage and to prevent abate pollution and contamination to protect public health, aquatic resources, crops and other living organisms.

# Classification of Water Bodies

Classification	Intended Beneficial Use
Class AA	Public Water Supply Class I – Intended for primarily for waters having watershed, 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 II – Intended as sources of water supply requiring conventional treatment (coagulation, sedimentation, filtration and disinfection) to meet the latest PNSDW
Class B	Recreational Water Class I – Intended for primary contact recreation (bathing, swimming, etc.)
<b>Class C</b>	<b>1. Fishery Water for the propagation and growth of fish and other aquatic resources</b> <b>2. Recreational Water Class II – For boating, fishing, or similar activities</b> 3. For agriculture, irrigation and livestock watering
Class D	Navigable waters

For unclassified water bodies, classification shall be based on the beneficial use as determined by the EMB

# Classification of Water Bodies

Classification	Intended Beneficial Use
Class SA	<ol style="list-style-type: none"> <li>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.</li> <li>2. <b>Fishery Water Class I – Suitable for shellfish harvesting for direct human consumption</b></li> </ol>
Class SB	<ol style="list-style-type: none"> <li>1. <b>Fishery Water Class II – Waters suitable for commercial propagation of shellfish and intended as spawning areas for milk fish (<i>Chanos chanos</i>) and similar species</b></li> <li>2. Tourist Zones – For ecotourism and recreational activities</li> <li>3. Recreational Water Class I – Intended for primary contact recreation (bathing, swimming, skin diving, etc.)</li> </ol>
<b>Class SC</b>	<ol style="list-style-type: none"> <li>1. <b>Fishery Water Class III – For the propagation and growth of fish and other aquatic resources and intended for commercial and sanctuaries</b></li> </ol>
Class D	Navigable waters

For unclassified water bodies, classification shall be based on the beneficial use as determined by the EMB

# Classification of Water Bodies

## Water Body Classification and Usage of Freshwater

<b>Classification</b>	<b>No. of Water Bodies</b>
<b>Class AA</b>	<b>6*</b>
<b>Class A</b>	<b>240*</b>
<b>Class B</b>	<b>206</b>
<b>Class C</b>	<b>324</b>
<b>Class D</b>	<b>31</b>

\*Some water bodies have more than one classification such as Class AA at the uppermost portion of the river and D at the lowest portion of the river

# Classification of Water Bodies

## Water Body Classification and Usage of Marine Waters

<b>Classification</b>	<b>No of Water Bodies</b>
<b>Class SA</b>	<b>6*</b>
<b>Class SB</b>	<b>42</b>
<b>Class SC</b>	<b>42</b>
<b>Class SD</b>	<b>31</b>

\*Some water bodies have more than one classification

# Table 6-1. Water Quality Guidelines for Primary Parameters

Parameter	Unit	Water Body Classification								
		AA	A	B	<b>C</b>	D	SA	SB	<b>SC</b>	SD
BOD	mg/L	1	3	5	<b>7</b>	15	n/a	n/a	<b>n/a</b>	n/a
Chloride	mg/L	250	250	250	<b>350</b>	400	n/a	n/a	<b>n/a</b>	n/a
Color	TCU	5	50	50	<b>75</b>	150	5	50	<b>75</b>	150
Dissolved Oxygen <sup>(a)</sup> (Minimum)	mg/L	5	5	5	<b>5</b>	2	6	6	<b>5</b>	2
Fecal Coliform	MPN/100mL	<1.1	<1.1	100	<b>200</b>	400	<1.1	100	<b>200</b>	400
Nitrate as NO <sub>3</sub> -N	mg/L	7	7	7	<b>7</b>	15	10	10	<b>10</b>	15
pH (Range)		6.5-8.5	6.5-8.5	6.5-8.5	<b>6.5-9.0</b>	6.0-9.0	7.0-8.5	7.0-8.5	<b>6.5-8.5</b>	6.0-9.0
Phosphate	mg/L	<0.003	0.5	0.5	<b>0.5</b>	5	0.1	0.5	<b>0.5</b>	5
Temperature <sup>(b)</sup>	°C	26-30	26-30	26-30	<b>25-31</b>	25-32	26-30	26-30	<b>25-31</b>	25-32
Total Suspended Solids	mg/L	25	50	65	<b>80</b>	110	25	50	<b>80</b>	110

Notes:

MPN/100mL – Most Probable Number per 100 milliliter

n/a – Not Applicable

TCU – True Color Unit

(a) Samples shall be taken from 9:00 AM to 4:00 PM.

(b) The natural background temperature as determined by EMB shall prevail if the temperature is lower or higher than the WQG; provided that the maximum increase is only up to 10 percent and that it will not cause any risk to human health and the environment.

# Table 6-2. Water Quality Guidelines for Secondary Parameters-Inorganics

Parameter	Unit	Water Body Classification								
		AA	A	B	<b>C</b>	D	SA	SB	<b>SC</b>	SD
Ammonia as NH <sub>3</sub> -N	mg/L	0.05	0.05	0.05	<b>0.05</b>	0.75	0.04	0.05	<b>0.05</b>	0.75
Boron	mg/L	0.5	0.5	0.5	<b>0.75</b>	3	0.5	0.5	<b>5</b>	20
Fluoride	mg/L	1	1	1	<b>1</b>	2	1.5	1.5	<b>1.5</b>	3
Selenium	mg/L	0.01	0.01	0.01	<b>0.02</b>	0.04	0.01	0.01	<b>0.1</b>	0.2
Sulfate	mg/L	250	250	250	<b>275</b>	500	250	250	<b>275</b>	500



# Table 6-3. Water Quality Guidelines for Secondary Parameters-Metals<sup>(c)</sup>

Parameter	Unit	Water Body Classification								
		AA	A	B	<b>C</b>	D	SA	SB	<b>SC</b>	SD
Arsenic	mg/L	0.01	0.01	0.01	<b>0.02</b>	0.04	0.01	0.01	<b>0.02</b>	0.04
Barium	mg/L	0.7	0.7	0.7	<b>3</b>	4	0.1	0.7	<b>1</b>	4
Cadmium	mg/L	0.003	0.003	0.003	<b>0.005</b>	0.01	0.003	0.003	<b>0.005</b>	0.01
Chromium as Hexavalent Chromium (Cr <sup>6+</sup> )	mg/L	0.01	0.01	0.01	<b>0.01</b>	0.02	0.05	0.05	<b>0.05</b>	0.1
Copper as Dissolved Copper	mg/L	0.02	0.02	0.02	<b>0.02</b>	0.04	0.02	0.02	<b>0.02</b>	0.04
Iron	mg/L	1	1	1	<b>1.5</b>	7.5	1.5	1.5	<b>1.5</b>	7.5
Lead	mg/L	0.01	0.01	0.01	<b>0.05</b>	0.1	0.01	0.01	<b>0.05</b>	0.1
Manganese	mg/L	0.2	0.2	0.2	<b>0.2</b>	2	0.4	0.4	<b>0.4</b>	4
Mercury	mg/L	0.001	0.001	0.001	<b>0.002</b>	0.004	0.001	0.001	<b>0.002</b>	0.004
Nickel	mg/L	0.02	0.02	0.04	<b>0.2</b>	1	0.02	0.04	<b>0.06</b>	0.3
Zinc	mg/L	2	2	2	<b>2</b>	4	0.04	0.05	<b>0.8</b>	1.5

Note: (c) Unless otherwise specified, the above parameters are expressed as total metals.

# Table 6-4. Water Quality Guidelines for Secondary Parameters-Organics

Parameter	Unit	Water Body Classification								
		AA	A	B	C	D	SA	SB	SC	SD
Benzo(a)pyrene	µg/L	0.7	0.7	0.7	<b>1.5</b>	3	0.7	0.7	<b>1.5</b>	3
BTEX										
Benzene	mg/L	0.01	0.01	0.01	<b>0.05</b>	0.5	0.01	0.01	<b>0.05</b>	0.5
Toluene	mg/L	0.7	0.7	1	<b>4</b>	5	1	1	<b>4</b>	5
Ethylbenzene	mg/L	0.3	0.3	0.3	<b>1.5</b>	2	0.2	0.2	<b>1.5</b>	2
Xylenes	mg/L	0.5	0.5	0.5	<b>1.5</b>	1.8	0.5	0.5	<b>1.5</b>	1.8
Cyanide as Free Cyanide	mg/L	0.07	0.07	0.07	<b>0.1</b>	0.2	0.02	0.02	<b>0.1</b>	0.2
Organophosphate as Malathion	µg/L	1	1	1	<b>3</b>	6	1	1	<b>3</b>	6
Oil and Grease	mg/L	<1	1	1	<b>2</b>	5	1	2	<b>3</b>	5
Polychlorinated Biphenyls <sup>(d)</sup>	µg/L	<0.1	<0.1	0.2	<b>0.5</b>	1	0.3	0.3	<b>0.5</b>	1
Phenol & Phenolic Substances <sup>(e)</sup>	mg/L	<0.001	<0.001	<0.001	<b>0.05</b>	0.5	<0.001	<0.001	<b>0.05</b>	0.5
Surfactants (MBAS)	mg/L	<0.025	0.2	0.3	<b>1.5</b>	3	0.3	0.3	<b>1.5</b>	3
Trichloroethylene	mg/L	0.07	0.07	0.07	<b>0.9</b>	2	0.07	0.07	<b>0.9</b>	2

# Table 6-4. Water Quality Guidelines for Secondary Parameters-Organics

Parameter	Unit	Water Body Classification								
		AA	A	B	<b>C</b>	D	SA	SB	<b>SC</b>	SD
Total Organochlorine Pesticides <sup>(f)</sup>	µg/L	n/a	n/a	50	<b>50</b>	50	50	50	<b>50</b>	50
Aldrin	µg/L	0.03	0.03	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Chlordane	µg/L	0.2	0.2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dichlorodiphenyltrichloroethane (DDT)	µg/L	1	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dieldrin	µg/L	0.03	0.03	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Endrin	µg/L	0.6	0.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Heptachlor	µg/L	0.03	0.03	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lindane	µg/L	2	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Methoxychlor	µg/L	50	50	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Toxaphene	µg/L	4	4	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Notes:

CAS - Chemical Abstracts Service

IUPAC – International Union of Pure and Applied Chemistry

MBAS – Methylene Blue Active Substances

µg/L – microgram per liter

(d) Polychlorinated Biphenyls (PCBs) include the nine Aroclors and 19 individual PCB congeners described below:

# General Effluent Standards (GES)

- Discharges from any point source shall at all times meet the effluent standards to maintain the required water quality per water body classification. The GES shall be used **regardless of the industry category.**

# Significant Effluent Quality Parameters per Sector

<b>PSIC CODE</b>	<b>Industry Category</b>	<b>Significant Parameters</b>
032	<b>Aquaculture (except fish pens)</b>	BOD, Total Suspended Solids, Ammonia, Nitrate, Phosphate, Sulfate
1020	Processing and preserving of fish, crustaceans and mollusks (except carrageenan)	Temperature, pH, BOD, Total Suspended Solids, Nitrates, Oil and Grease
OC1	Public Markets	Color, Temperature, pH, BOD, Total Suspended Solids, Ammonia, Nitrate, Chloride, Oil and Grease

# Effluent Standards

Parameter	Unit	Water Body Classification								
		AA	A	B	C	D	SA	SB	SC	SD
Ammonia as NH <sub>3</sub> -N	mg/L	NDA	0.5	0.5	0.5	7.5	NDA	0.5	0.5	7.5
BOD	mg/L	NDA	20	30	50	120	NDA	30	100	150
Chloride	mg/L	NDA	350	350	450	500	NDA	n/a	n/a	n/a
Color	TCU	NDA	100	100	150	300	NDA	100	150	300
Nitrate as NO <sub>3</sub> -N	mg/L	NDA	14	14	14	30	NDA	20	20	30
pH (Range)		NDA	6.0-9.0	6.0-9.0	6.0-9.5	5.5-9.5	NDA	6.5-9.0	6.0-9.0	5.5-9.5
Phosphate	mg/L	NDA	1	1	1	10	NDA	1	1	10
Sulfate	mg/L	NDA	500	500	550	1,000	NDA	500	550	1,000
Temperature <sup>(h)</sup>	°C change	NDA	3	3	3	3	NDA	3	3	3
Total Suspended Solids	mg/L	NDA	70	85	100	150	NDA	70	100	150
Oil and Grease	mg/L	NDA	5	5	5	15	NDA	5	10	15

NDA – No Discharge Allowed

**Guidelines on the Procedures and Technical Requirements for the Issuance of Certification Allowing the Safe Re-Use of Wastewater for Agricultural Purposes or Irrigation Uses, Pursuant to Section 22.C of R.A 9275, otherwise known as the Philippine Clean Water Act of 2004**



**Department of Agriculture Administrative Order No. 26, Series of 2007**

# Section 5. Sources of Wastewater

1. Livestock – includes piggeries, beef and dairy feedlots
2. Agriculture and food industrial processes – include food handling; processing and manufacturing plants; sugar mills; refineries and distilleries including biofuels production; slaughterhouses and poultry dressing plants
3. Aquaculture – includes reservoir, hatcheries, ponds, tanks, aquaria, etc.
4. Domestic and municipal sewage
5. Other industrial and commercial establishments

The DA shall issue certification for the re-use of wastewater from these sources provided that they comply with the requirements as provided for in this Order.



# Aquaculture

Pond water shall be free from toxic chemicals, heavy metals and microorganisms (e.g., bacteria, parasites, viruses and fungi), which are harmful to fishes. Potential danger of pathogen transmissions present in the fish and in the culture environment to handlers and the consumers must be prevented.

Wastewater for grow-out culture of fishes and other fishery resources must comply with the limits outlined in Table 2.

**Table 2. Limits on wastewater quality for fresh and brackish water fish culture**

Parameter	Quality requirements (concentration)	
	Freshwater	Brackishwater
For Fish Productivity		
1. Alkalinity (CaCO <sub>3</sub> ) (mg/L)	20 - 300	> 80
2. Ammonia-Nitrogen (NH <sub>3</sub> -N) (mg/L)	≤ 0.06	≤ 0.01
3. Bacterial Count		
a. Vibrio sp. (cfu/mL)	Not applicable	≤ 1.3 x 10 <sup>3</sup>
b. Luminous Bacteria (cfu/mL)	Not applicable	≤ 2.0 x 10 <sup>2</sup>
4. BOD <sub>5</sub> (mg/L)	≤ 9	≤ 9
5. Carbon Dioxide (CO <sub>2</sub> ) (mg/L)	≤ 7	≤ 15
6. Dissolved Oxygen (mg/L)	> 5	> 5
7. Hydrogen Sulfide (H <sub>2</sub> S) (mg/L)	≤ 0.003	≤ 0.02

Parameter	Quality requirements (concentration)	
	Freshwater	Brackishwater
<b>For Fish Productivity</b>		
8. Nitrate-Nitrogen (NO <sub>3</sub> <sup>-</sup> -N)(mg/L)	≤ 0.067	≤ 0.4
9. pH	6.5 – 9.0	7.5 – 8.5
10. Phosphate (PO <sub>4</sub> <sup>3-</sup> )(mg/L)	≤ 0.025	0.2 – 0.4
11. Salinity (ppt)	> 5	25 – 30
12. Temperature (°C)	25 – 32	25 – 32
13. TSS (mg/L)	≤ 1000	≤ 1000
<b>For Human Health</b>		
1. Antibiotic Residues Chloramphenicol Nitrofurans	Negative Negative	Negative Negative
2. Coliform bacteria (MPN/100mL)	≤ 5,000	≤ 1,000

**“The earth is the Lord’s, and everything in it, the world, and all who live in it; for He founded it upon the seas and established it upon the waters.”**

***--- Psalm 24:1***

**“Be good environmental stewards for the glory of God.”**

***--- Colossians 3:23***



**Thank you  
for your attention!**