

# **QUALITY OF WATER AND WASTEWATER FOR URBAN AND INDUSTRIAL DEVELOPMENT**

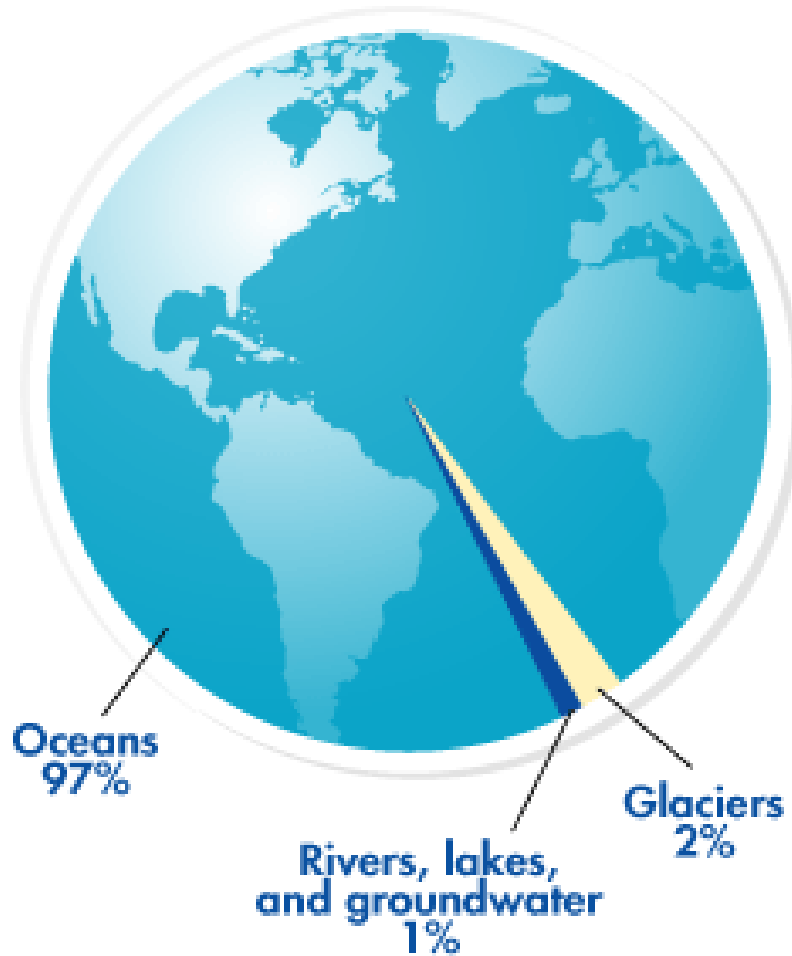
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and

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# Usable water in the world



**Water volume = 1.386 billion cubic kilometers**

Source:

<http://www.waynecountynysoilandwater.org/water/>

M. Nakamura, RCSE Shiga University, Chairman ILEC Scientific Committee



**Hazards of long-term consumption of low-mineral water**

**Contamination of bottled water with coliforms and other bacteria**

**Solid waste – used bottled water**



# WATER QUALITY

describes the chemical, physical, and biological characteristics of water with respect to its suitability for a particular use (Acad. E.J. del Rosario)

**Water quality** requirement for each particular use

**“Water quality limits Water quantity”**

**Wastewater** is part of water supply to the community, industry/manufacturing, agriculture, etc. which has been mixed with suspended or dissolved solid, and usually contains pollutants. (Acad. E.J. del Rosario)

**Wastewater quality** requirement for each particular use is based on the classification of the receiving body of water (**intended beneficial use**)

DENR  
DEPT. ADMINISTRATIVE ORDER (DAO) 2016-08

WATER QUALITY GUIDELINES  
AND GENERAL EFFLUENT STANDARDS

(Grace Period of 5 years)

➤ The DENR promulgated and adopts DENR Administrative Order (DAO) No. 2016-08 pursuant to Republic Act No. 9275 otherwise known as the Philippine Clean Water Act of 2004.

➤ Covers both Water Quality Guidelines (WQG) and General Effluent Standards (GES);

➤ New parameters have been added and some parameters are either more stringent or more lenient than the previous DAO 34 (Water Quality Criteria) and DAO 35 (Effluent Standards) series of 1990

# GENERAL EFFLUENT STANDARDS

- Under the old guidelines in DAO 35, general standards for all type of effluents are the same.
- In the new guidelines, significant effluent quality parameters for each industry type are specified. They are based on the most probable pollutant that a type of industry will discharge into the environment.



# GENERAL EFFLUENT STANDARDS

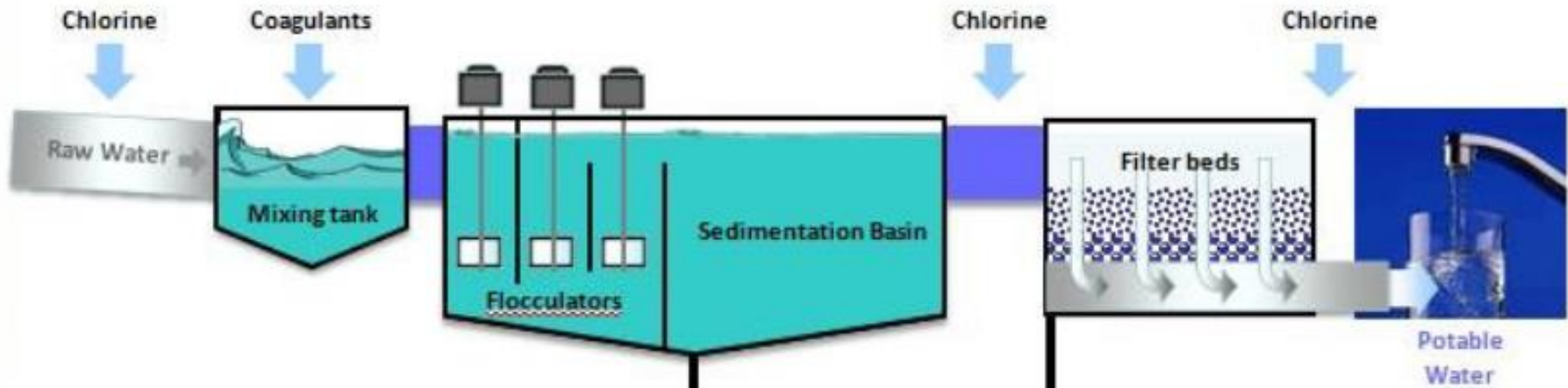
Examples of GES for certain industry groups:

- ❖ **Paper and paperboard milling** (*PSIC Code #17013*) - Color, Temperature, pH, COD, TSS, Nitrate, Phosphate, Ammonia, Barium, Boron, Chloride, Arsenic, Cadmium, Chromium, Copper, Lead, Mercury and Zinc.
- ❖ **Hotels, motels, resorts, dormitories and other accommodation services** (*PSIC Code #55*) will be monitored for BOD, Fecal Coliform, Ammonia, Nitrate, Phosphate, Oil & Grease, and surfactants.

These significant parameters however can still be modified through an appeal to the DENR Secretary. The EMB will determine if such request is valid.

# Water Treatment Process at the Balara Plants

PRE-CHLORINATION	COAGULATION	FLOCCULATION	SEDIMENTATION	INTERMEDIATE CHLORINATION	FILTRATION	POST CHLORINATION
Removal of algae and improves coagulation	Addition of chemicals with rapid mixing for suspended particles to form small flocs	Slow agitation or mixing to form fewer but bigger floc particles	Settling of floc particles by gravity	Further removal of algae before filtration	Filtering of remaining suspended particles	Disinfection or removal of disease causing organisms



## 9. Disinfection residual

## PNSDW

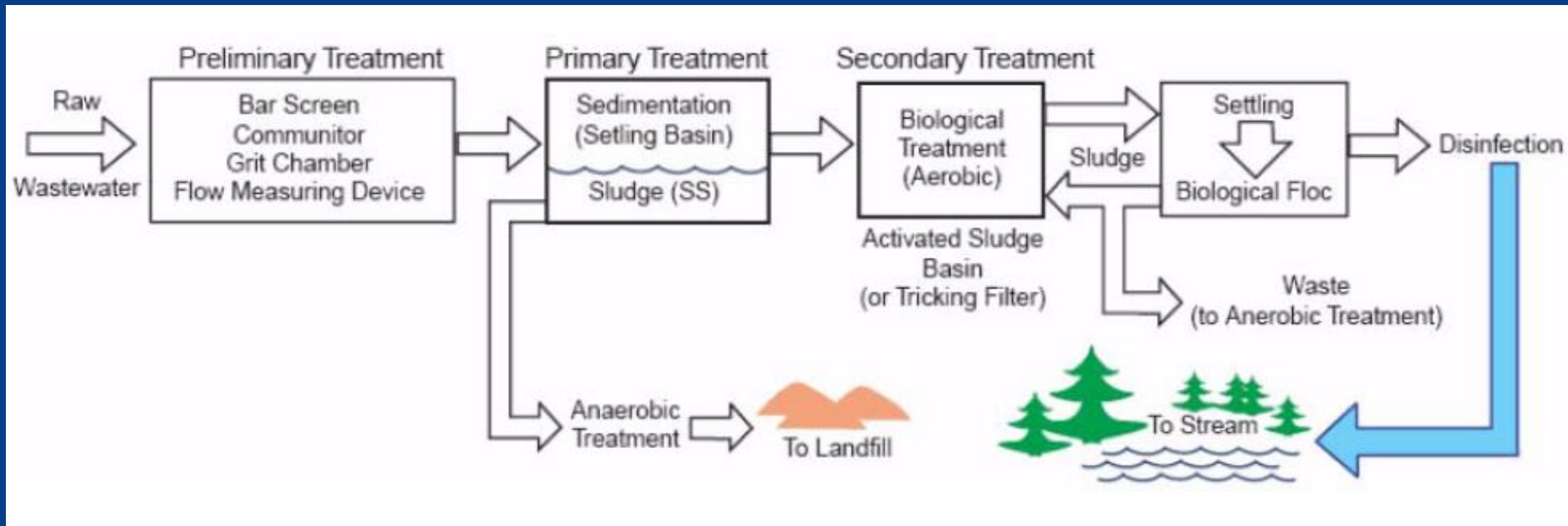
Residual Chlorine  
(mg/L)

0.3-1.5

Chlorine Dioxide  
(mg/L)

0.2-0.4

# SCHEME OF TYPICAL WASTEWATER TREATMENT FACILITY



Protocol on chlorination???

None in DAO 2016-08

# THAT THING CALLED “END OF PIPE”



COMPLIANCE TO THE EFFLUENT STANDARDS: CLASSIFICATION OF RECEIVING WATER: PSIC

Monitoring and Regulation





**POINT and NON-POINT SOURCES OF ORGANIC POLLUTION ???**

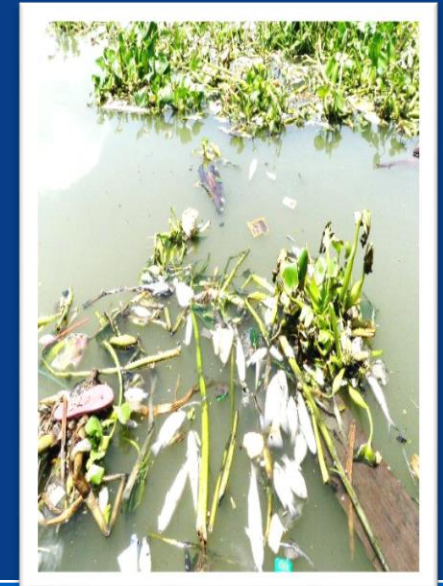
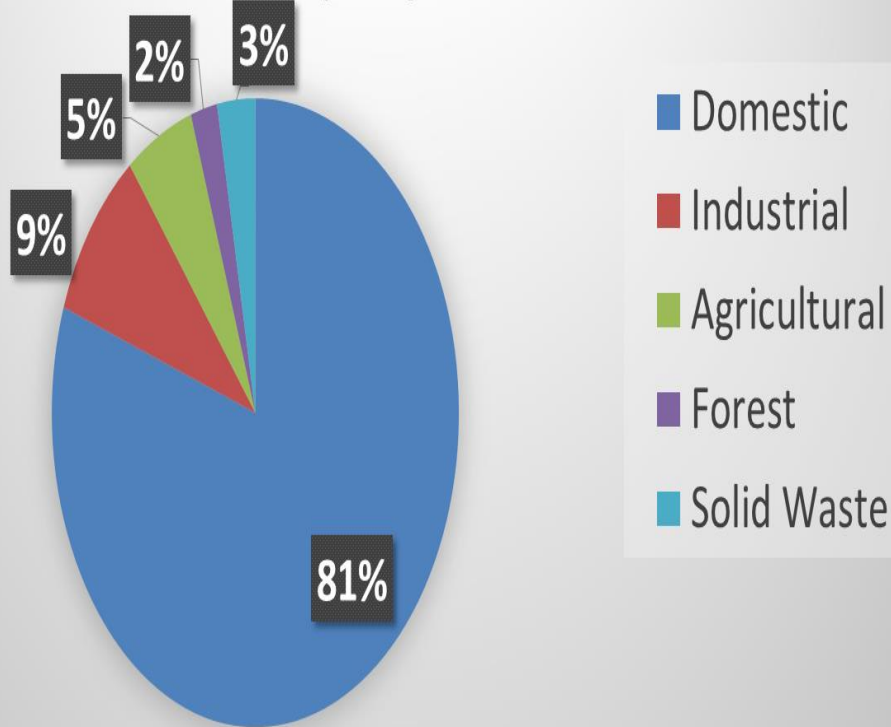
## Use of stable isotopes in water quality monitoring and assessment

- Stable isotopes of nitrate nitrogen ( $\delta^{15}\text{N}$ ) and oxygen ( $\delta^{18}\text{O}$ ) is being used to trace nitrate sources in hydrosphere.
- On-going study in Sta. Rosa subwatershed of Laguna de Bay to identify the source of nitrate pollution in the groundwaters during the dry and wet seasons.



# Pollution loading (BOD)

### 2014 BOD loadings within the Laguna de Bay Region



Domestic Wastes	64,549 tons/year
Industrial Wastes	7,207
Agricultural	4,104
Forest	1,676
Solid Wastes	2,416
<b>Total</b>	<b>79,952</b>

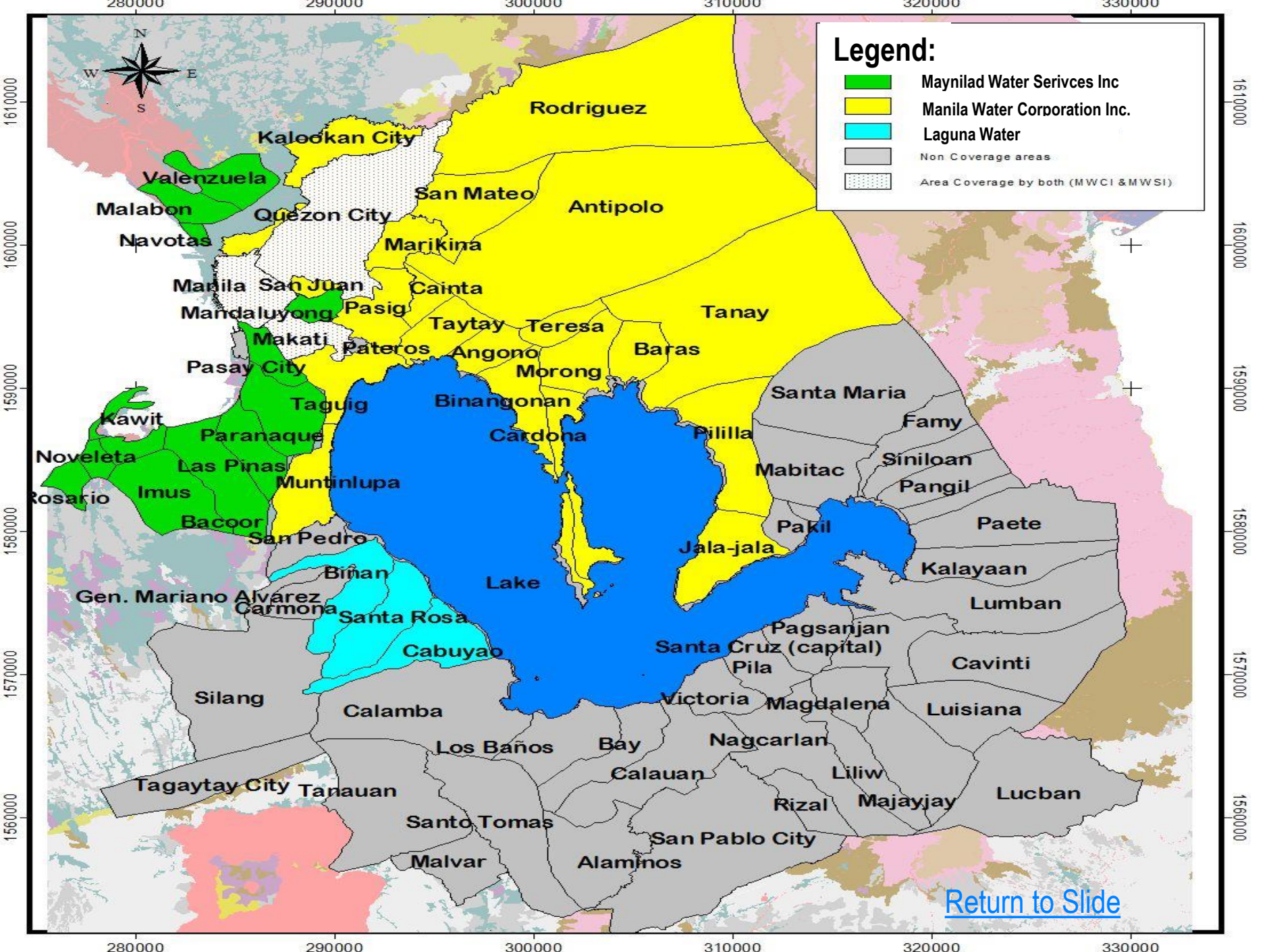
In the Philippines, only 10% of wastewater is treated while 58% of the groundwater is contaminated;

- Only 5% of the total population is connected to a sewer network. The vast majority uses flush toilets connected to septic tanks;
- Since sludge treatment and disposal facilities are rare, domestic wastewater is discharged without treatment;

- UNICEF & WHO Study.

- From the presentation of Dir. Normalyn Claudio, EMB, R3





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# Eutrophication

Algal bloom







LAKE



RIVER



# ADDITIONAL PARAMETERS UNDER THE NEW DAO

Parameter	DAO 2016-08	Parameter	DAO 2016-08	Parameter	DAO 2016-08
Ammonia as NH <sup>3</sup> -N, mg/L	0.5	Manganese, mg/L	2	Total Organochlorine Pesticides, mg/L	50
Boron, mg/L	3	Nickel, mg/L	1	Aldrin	<0.02
Chloride, mg/L	450	Zinc, mg/L	4	Chlordane	<0.02
Fluoride, mg/L	2	Benzo(a)pyrene	3	DDT	<0.04
Nitrate as NO <sub>3</sub> -N, mg/L	14	BTEX, mg/L		Dieldrin	<0.02
Phosphate, mg/L	1	Benzene	0.5	Endrin	<0.02
Selenium, mg/L	0.04	Toluene	20	Heptachlor	<0.02
Sulfate, mg/L	550	Ethylbenzene	7.5	Lindane	<0.02
Barium, mg/L	6	Xylenes	15	Methoxychlor	<0.03
Copper as dissolved, mg/L	0.04	Malathion (organophosphate), mg/L	3	Toxaphene	<0.03
Iron, mg/L	7.5	Trichloroethylene, mg/L	9	Fecal coliform, mg/L	400



RMDD

PDME

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**Quantity and Quality  
Technology to deal with the current quality**



# THANK YOU FOR YOUR KIND ATTENTION

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