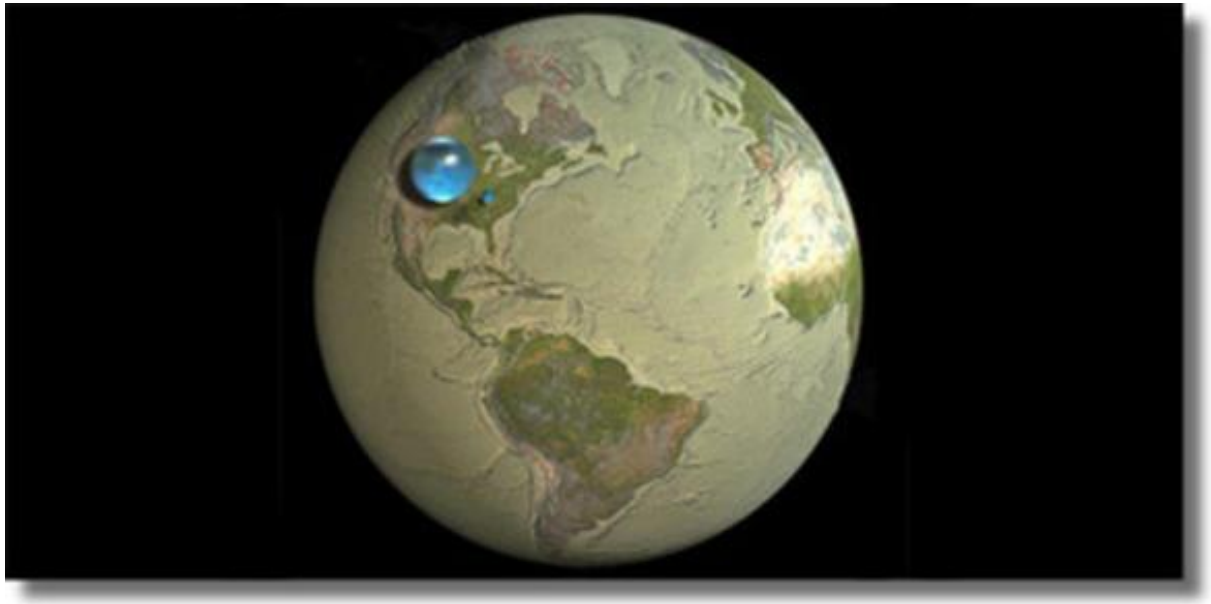
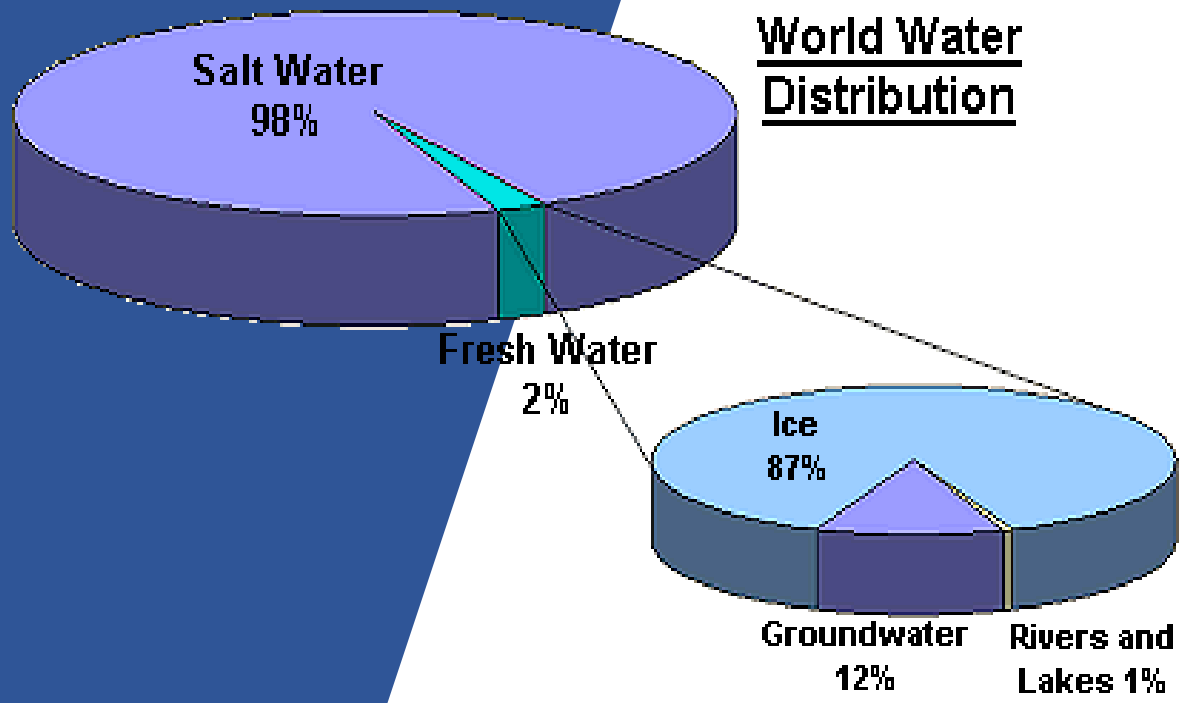
WATER and WETLANDS

FRANCISCO ARELLANO

WORLD WATER DISTRIBUTION

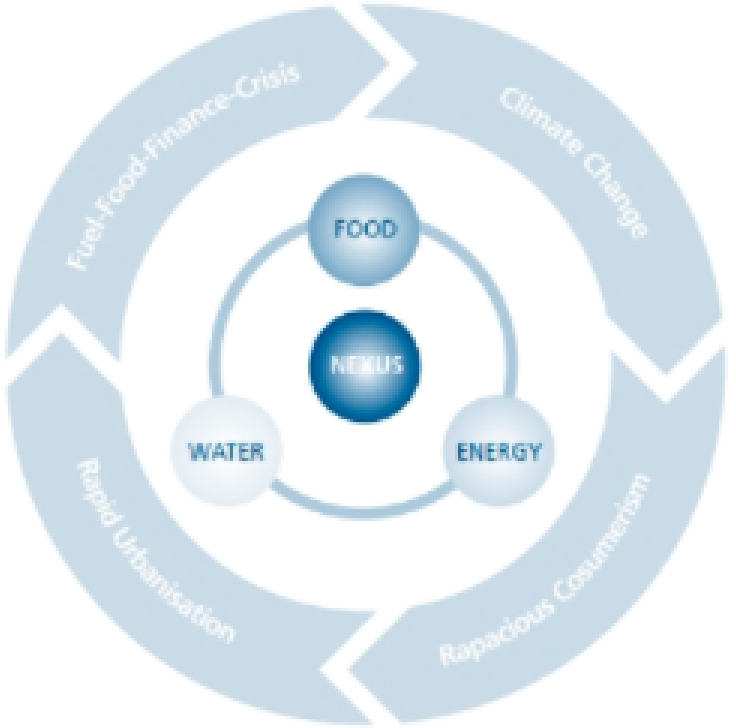


OUR WATER REOURCE IS FINITE. IT IS ESTIMATED THAT THE RESOURCE IS 332.5 M CUBIC MILES



WATER, FOOD ENERY **NEXUS**

The water-food-energy nexus and its drivers



In 2050, there will be 9.2 billion people resulting in 70% increase in demand for food and 40% increase in demand for energy.

By 2030, the world will confront a water supply shortage of about 40%.

A rapidly rising global population and growing prosperity are putting unsustainable pressures on resources. Demand for water, food and energy is expected to rise by 30-50% in the next two decades, while economic disparities incentivize short-term responses in production and consumption that undermine long-term sustainability.

Shortages could cause social and political instability, geopolitical conflict and irreparable environmental damage. Any strategy that focuses on one part of the water-food-energy nexus without considering its interconnections risks serious unintended consequences.

Source: World Economic Forum (2011).

WATER TRIVIA

- We drink about **2.5 quarts of water a day** to stay healthy
- Families turn on faucets **70 times a day**
- **75% water is used in bathroom** (45% flushing, 30% for bathing)
- **25% Kitchen** (20% for dishes and laundry and 5% from drinking and cooking)
- We make at least **30 decisions a day that affect water**
- Flushing a toilet **losses 12-28 liters of water**

WATER TRIVIA

- Brushing your teeth for 2 minutes which running water, **24 liters**
- To produce a car, **146 m^3 of water**
- **40 liters of water is used for one can of processed fruit**
- **40 liters of water produce, 1 liter of milk, one acre of farmland for one cow**
- **95% of tomato** is water
- **80% ear corn** is water

WATER TRIVIA

- **70% of the elephant** is water
- **60% of the human body** is water
- **75% of the chicken** is water
- **80% of earth's surface** is water
- **2% is fresh water**
- **1% is available for water supply**

HAPPY DRINKING H2O!

Drinking water at the correct time maximizes its effectiveness on the human body:

2 GLASSES of water after waking up helps **activate internal organs**

1 GLASS of water 30 minutes before a meal **helps digestion**

1 GLASS of water before taking a bath/shower **helps lower blood pressure**

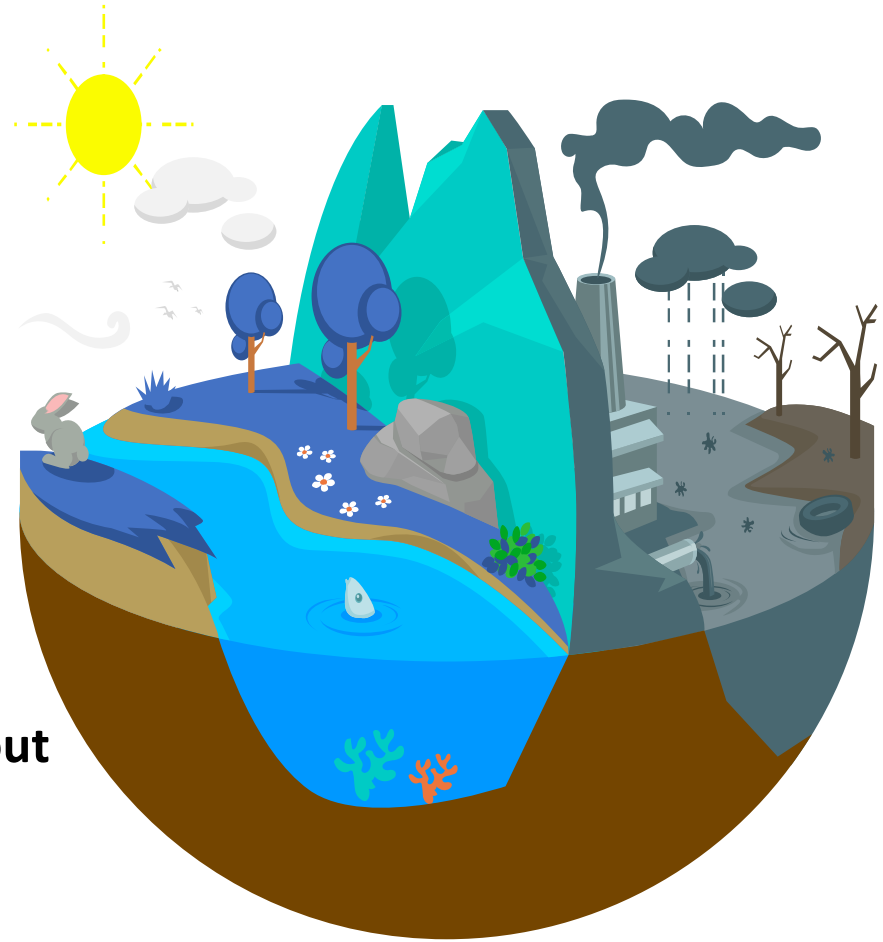
1 GLASS of water before going to bed **avoids stroke or heart attack**

WATER SECURITY

Water is essential[1] to sustain life[2].

Water = National Security

Security



[1]society cannot survive without water

[2]humans, animals, plants

Water is Priority No. 1

- Water is essential to sustain human life (health, disease prevention and sanitation)
- Metro Manila's has 1/5 of national population (20M)*
- NCR generates 36% of national GDP (PhP6.5 trillion in 2018)
- Nationwide supply chain disruption

*Based on 2015 Census

Possible effects of severe water disruption

- Mass scramble for water
- Breakdown of law and order
- Mass exodus from MM
- Starvation
- Disease

Drought in Chennai, India

Main Water Challenges in Metro Manila

Photo courtesy of The Asian Age

Highly Vulnerable to

Natural Disaster and Climate Change

Photo courtesy of Boston

Frequent

Urban Flooding

Photo courtesy of The Strait Times

Insecurity in

Water Supply

Quality and Quantity of Water during Typhoon Ulysses

Quality

Quantity

MWSS Service Area

REPUBLIC OF THE PHILIPPINES
METROPOLITAN WATERWORKS AND SEWERAGE SYSTEM

AJA18-0185

Maynilad

West Zone

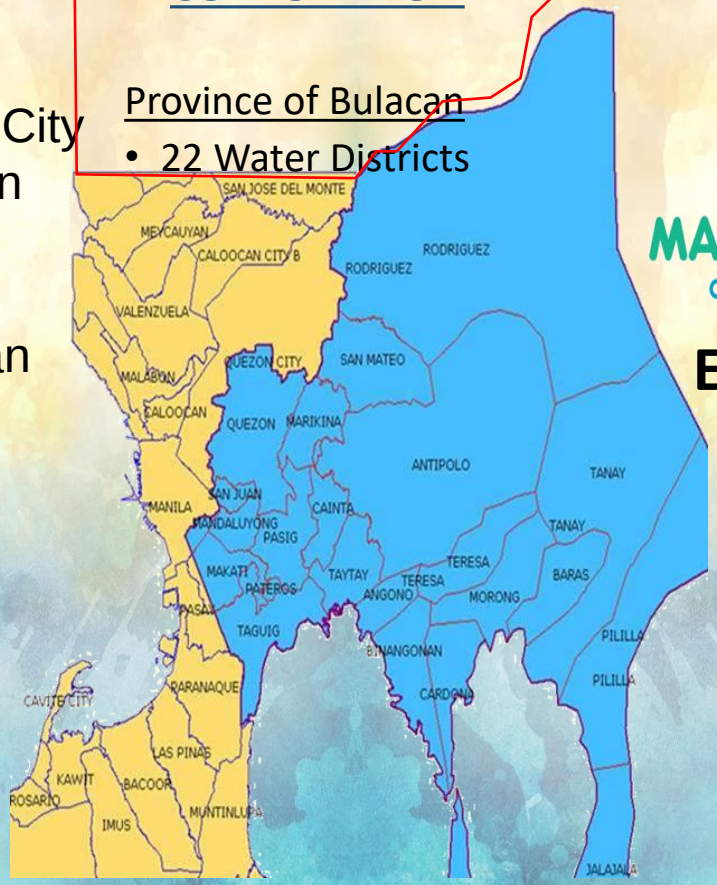
- North Quezon City
- North Caloocan
- Valenzuela
- Malabon
- South Caloocan
- Manila
- Pasay
- Makati
- Parañaque
- Cavite
- Las Piñas
- Muntinlupa
- Cavite

LUZON CLEAN WATER DEVELOPMENT CORPORATION

Province of Bulacan

- 22 Water Districts

BULACAN BULKWATER
SMC INFRASTRUCTURE



MANILA WATER
CARE IN EVERY DROP

East Zone

- Parts of Quezon City
- Marikina
- Pasig
- Pateros
- Taguig
- Makati
- Mandaluyong
- San Juan
- Parts of Manila
- Rizal Province

MWSS Privatization

REPUBLIC OF THE PHILIPPINES
METROPOLITAN WATERWORKS AND SEWERAGE SYSTEM

AJA18-0185

Population Served

FROM **5.82M**

TO **16.0M**

Sewer Coverage

FROM **9%**

TO **17%**

Sanitation Coverage

FROM **1%**

TO **20%**

Water Supply Coverage

FROM **48%**

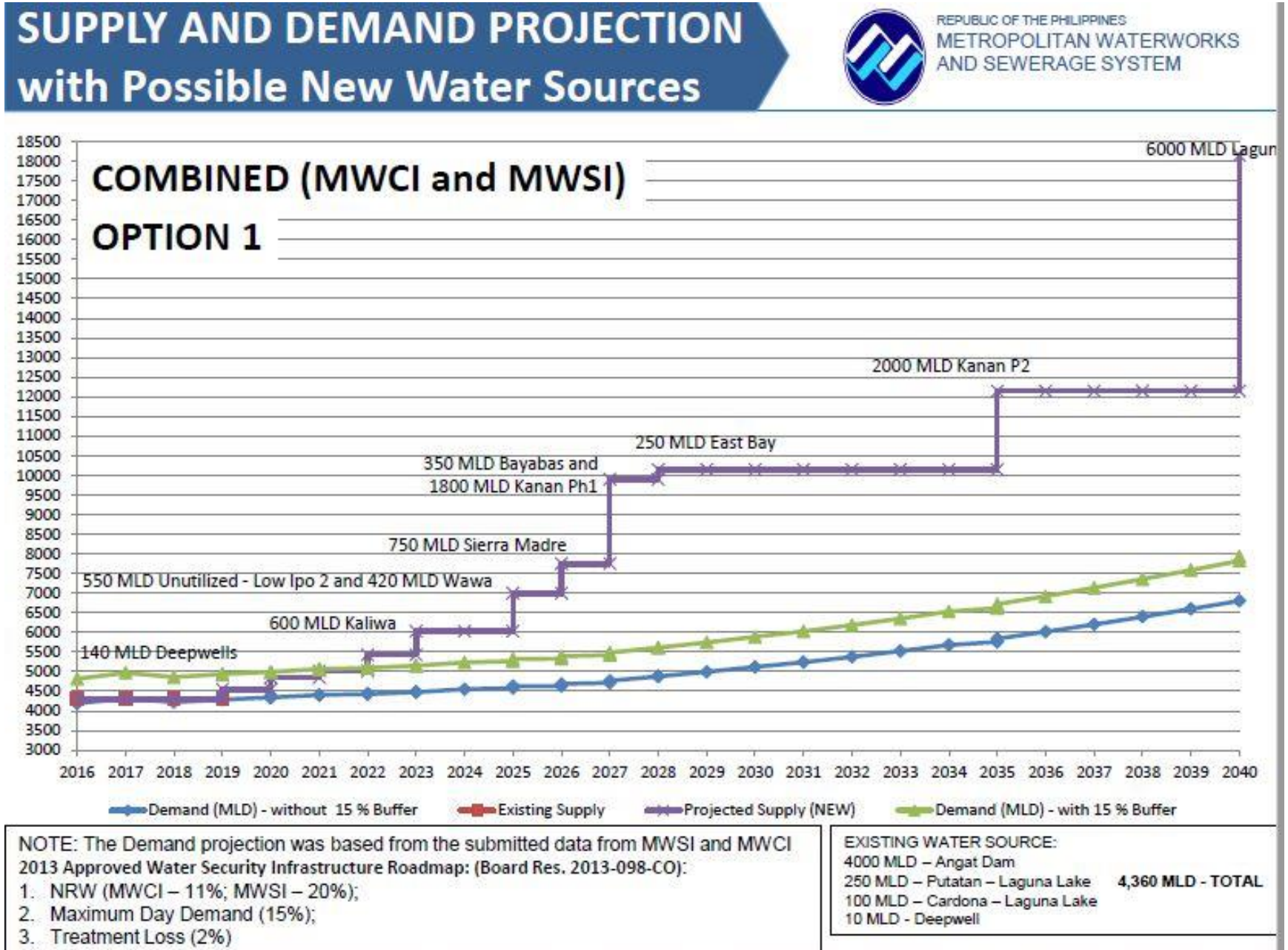
TO **94%**

Non-Revenue Water

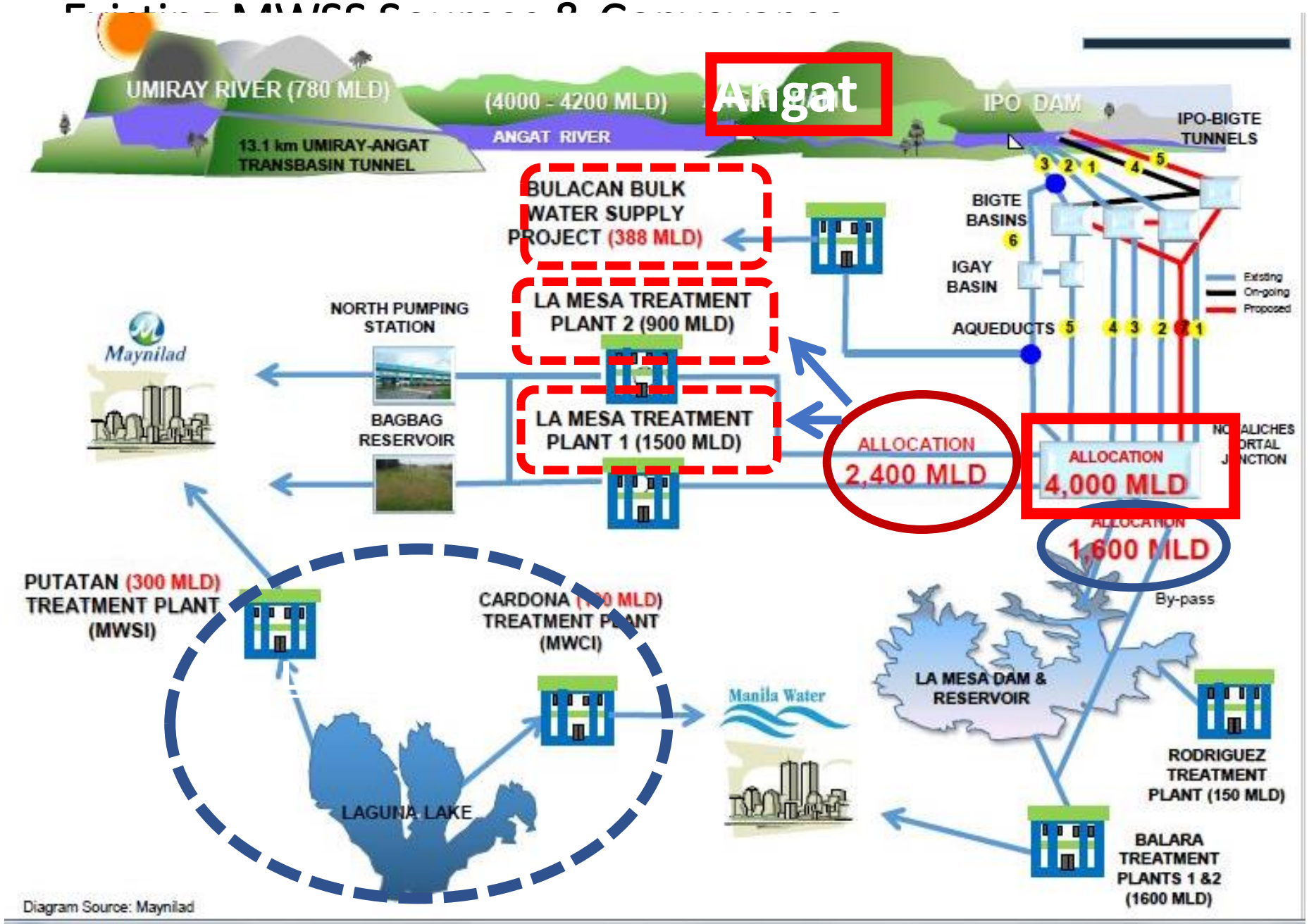
FROM **61%**

TO **25.5%**

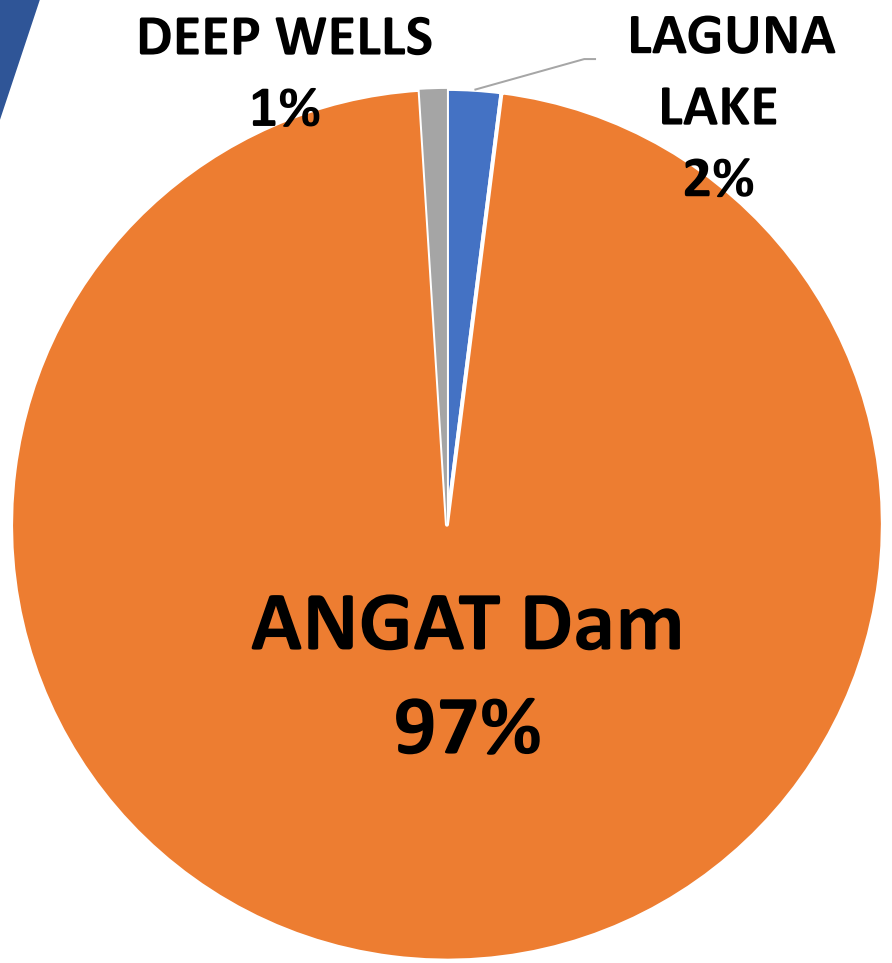
DEMAND and Supply



Existing MWSS Sources & Conveyances



HEAVY RELIANCE ON ANGAT DAM



UNACCEPTABLE risk - raw water Sources of MM*

Vulnerabilities of Angat source

- **Main problem – supply**

- **Vulnerabilities:**
- **1.) adverse climatic condition**
- **2.) catastrophic geologic movement- the Big One**

- Catastrophic earthquake – the Big One
- Prolonged drought due to climate change
- Increasing demand due to population growth
- Competing use among water users where irrigation is more often affected
- Limited capacity of the water source (dam/reservoir)
- Lack of water infrastructure to capture excess water during rainy season
- Groundwater not a viable alternative source due to depletion and slow recharge

ABOUT MAYNILAD

WEST ZONE:

17 cities and municipalities in the Greater Manila Area

ABOUT MAYNILAD

2,650 M

LITERS OF
POTABLE WATER

FROM FOUR
TREATMENT PLANTS

Maynilad

8th TOP LEADERS FORUM
From Risk to Resilience: Forging Pathways and Milestones

ABOUT MAYNILAD

7,000 KM

OF PIPE NETWORK

1.4 MILLION CONNECTIONS

THAT SERVE MORE THAN

9.7 MILLION CUSTOMERS

Maynilad

ABOUT MAYNILAD

FIVE-POINT PLAN

FIRST

We pushed the production capacity of our newl constructed Putatan Treatment Plant 2 from its initial output of 100 mld to the current 150 mld.

SECOND

We optimized our Putatan Treatment Plant 1 to produce an additional 10 mld. Both Putatan Plants now yield a combined supply of 310 mld from Laguna Lake.

THIRD

We sustain our Non-Revenue Water Reduction Program, which involves the replacement of old pipes, and repair of leaks, among others. This will give us 94 mld by February 2020.

FOURTH

We are reactivating deep wells to generate around 52 mld by yearend.

FOURTH

We are deploying four mobile treatment plants to Cavite, where there are existing N.I.A. Dams that can give us around 20 mld of additional supply.

Maynilad

FACILITIES

7.85 B

CAPITAL
EXPENDITURE COST

LA MESA TREATMENT PLANTS 1 AND 2

Maynilad

8th TOP LEADERS FORUM
From Risk to Resilience: Forging Pathways and Milestones

PROCESS: BUSINESS CONTINUITY MANAGEMENT SYSTEM

Maynilad's

operations are hinged on an ISO 22301-certified, enterprise-level, comprehensive business continuity management system

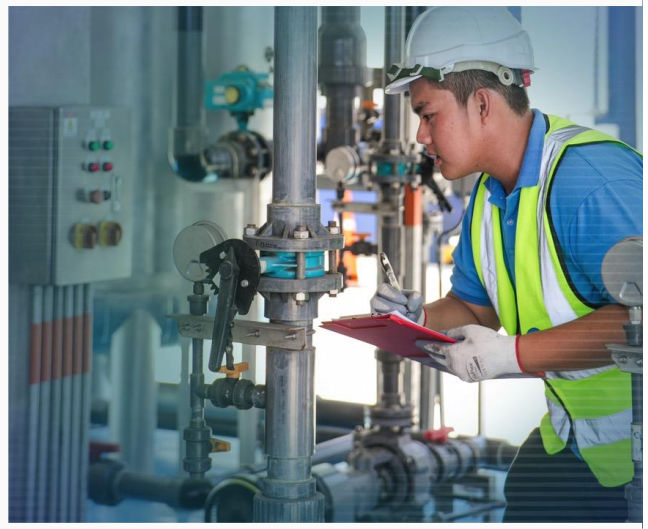
Maynilad

8th TOP LEADERS FORUM

From Risk to Resilience: Forging Pathways and Milestones

PEOPLE






PEOPLE

More than structures and flowcharts, we count on our passionate people.

Maynilad

8th TOP LEADERS FORUM
From Risk to Resilience: Forging Pathways and Milestones

CONCLUSION

First:

If it can happen, we need to be prepared for it.

Second:

Anything can happen.

The Philippine Water Supply and Sanitation Master Plan

Republic of the Philippines
National Economic and Development Authority

Aims to set the direction in helping the country address the WSS challenges and attain desired short-term, medium-term and long-term targets in water supply and sanitation

Objectives

- A Master Plan to help achieve targets in water supply and sanitation
- Develop strategies, policy reforms, identify priority programs & projects (short, medium & long-term)
- Update & integrate the PWSSR and PSSR into a single, comprehensive Master Plan, and link all other initiations relating to WSS, such as the Unified Financing Framework (UFF)
- Preparation of preliminary feasibility studies for identified priority programs and projects to determine viability

MWSS Water Security Legacy Plan

AJA18-0185

REPUBLIC OF THE PHILIPPINES
METROPOLITAN WATERWORKS AND SEWERAGE SYSTEM

1 Water Infrastructure Development and Resource Management

2 Sewerage and Sanitation

3 Water Distribution Efficiency

4 Tariff Rationalization and Business Plan Review

5 Partnership Development

6 Communications and Knowledge Management

7 Organizational Excellence

WETLANDS

BOGS
SWAMP
MARSHLAND

Wetlands

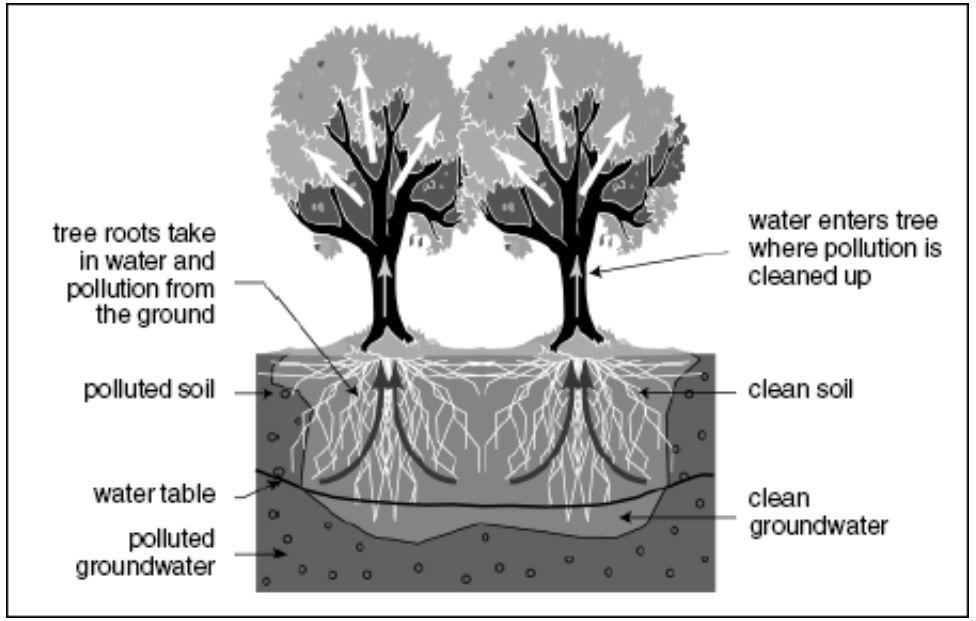
Wetland: an area that contains unique types of soil, is home to plants adapted to the wet environment, and contains water all year or certain times during the year

Wetlands at work

- Habitat: home to many species many threatened or endangered
- Food Factories: plants in wetlands serve base of wetland food webs
- Spawning Grounds and Nurseries: Many organisms reproduce here
- Cycling Nutrients: plants use carbon dioxide, produce oxygen, cycle nitrogen and phosphorus

PHYTOREMEDIATION

The use of plants to degrade a variety of pollutants present in wastewater.



Heavy Metals

Trace metals

Nutrients

Organics

Pathogens

CONSTRUCTED WETLAND DESIGN

Design Consideration

- SubSurface Flow Systems
  - Common in Europe
- Surface Flow Systems
  - More common in US/North America
  - Marsh-like
- Vertical Flow Systems
  - New design used to overcome oxygen depletion problem and boost nitrification

50,000*
trees are planted annually

Reforestation

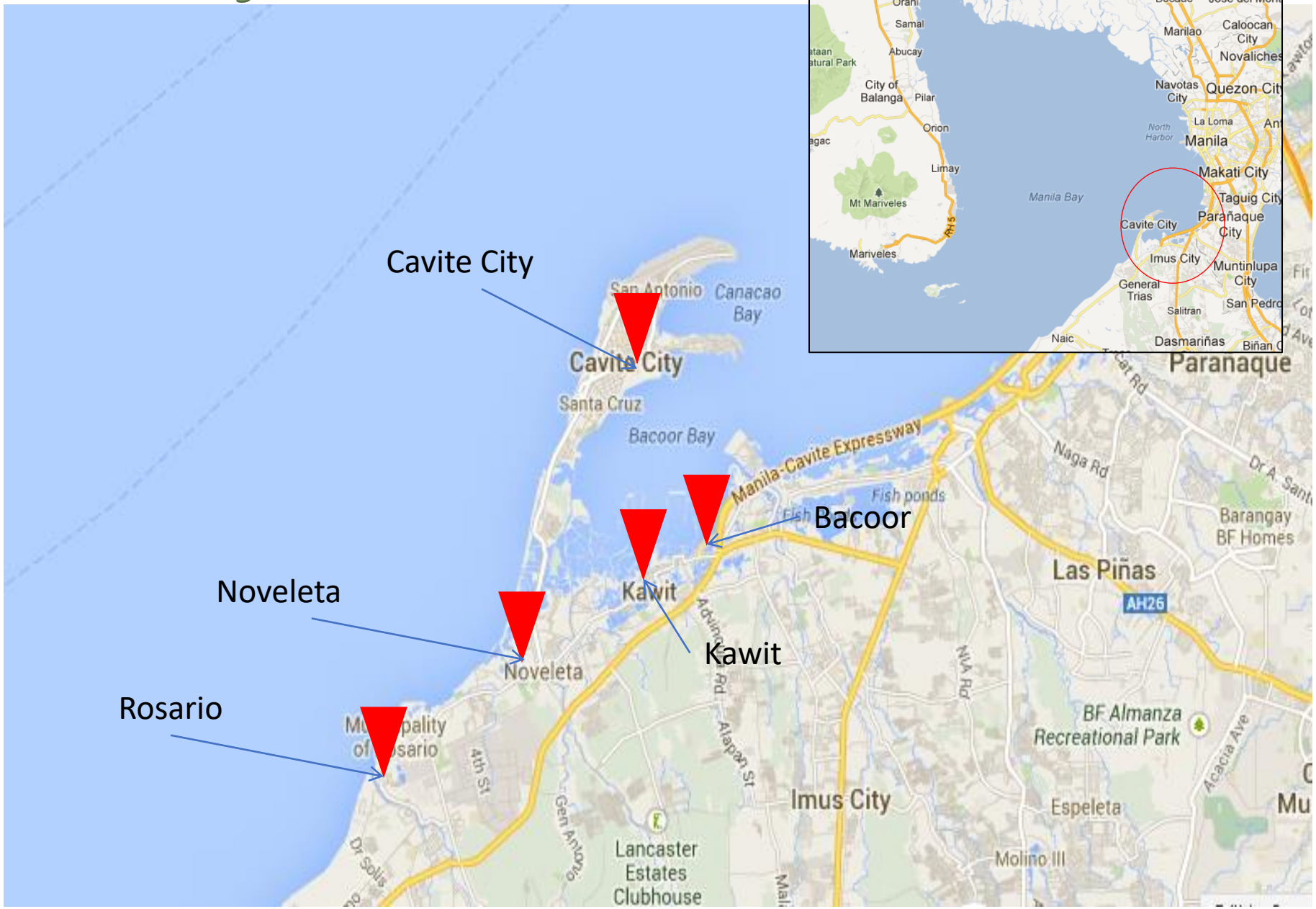
This is the first reforestation project which has institutionalized the inclusion of indigenous people Dumagats in the program.

Plant for Life

Mangrove Tree Planting Program

"Save the Bacoor-Cañacao-Manila Bay Program"

Project Locations



The Project

SAVE THE CANACAO-BACOOR-MANILA BAY :

REHABILITATE THE MANGROVE AREA

COOPERATING PARTNERS:

- ❑ Maynilad (CQESH, South Business Area, Marketing and Advocacy)
- ❑ Local Government Units
- ❑ Barangay Councils
- ❑ DENR-PENRO
- ❑ Marginalized Families in Coastal Areas
- ❑ Church
- ❑ NGOs and other Private Entities

MANGROVE ECOSYSTEM SERVICES

REGULATES:

- Protection of beaches and coastlines from storm surges, waves and floods.
- Reduction of beach and soil erosion
- Stabilization of land by trapping sediments
- Water Quality Maintenance
- Water regulation (groundwater recharge and discharge, flood and flow control)
- Climate regulation (maintenance of air quality, temperature, precipitation)

PROVIDES:

- Subsistence and commercial fisheries
- Aquaculture (small-scale, traditional)
- Hunting, honey, fuelwood, building materials and traditional medicines

SUPPORTS:

- Storage and recycling of nutrients
- Pollution control and detoxification
- Carbon Sequestration
- Nursery habitats
- Tourism and recreational Activities

MANGROVE ECOSYSTEM SERVICES

REGULATES:

- Protection of beaches and coastlines from storm surges, waves and floods.
- Reduction of beach and soil erosion
- Stabilization of land by trapping sediments
- Water Quality Maintenance
- Water regulation (groundwater recharge and discharge, flood and flow control)
- Climate regulation (maintenance of air quality, temperature, precipitation)

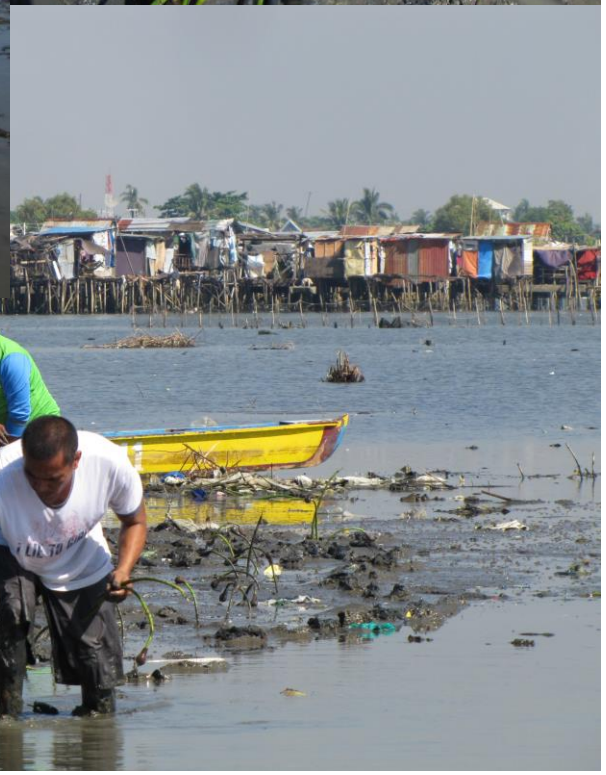
PROVIDES:

- Subsistence and commercial fisheries
- Aquaculture (small-scale, traditional)
- Hunting, honey, fuelwood, building materials and traditional medicines

Brgy. Rafae 4, Noveleta, Cavite

FAST GROWTH AND HIGH SURVIVAL RATE

Noveleta Planting Site Before



2

3

4

5

6

8

9

10

11

12

14

15

Rehabilitation of Mangroves in Cavite and Determination of Carbon Sequestration of Mangroves with Multi Stakeholders : Beyond the Practice of Corporate Social Responsibility, the Maynilad Way

Francisco Arellano
SAVP Maynilad

First ASEAN MANGROVE SUMMIT, OCT 1919

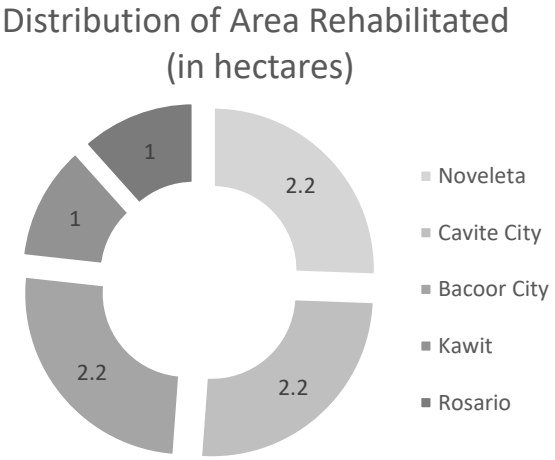
GREENHOUSE GASES

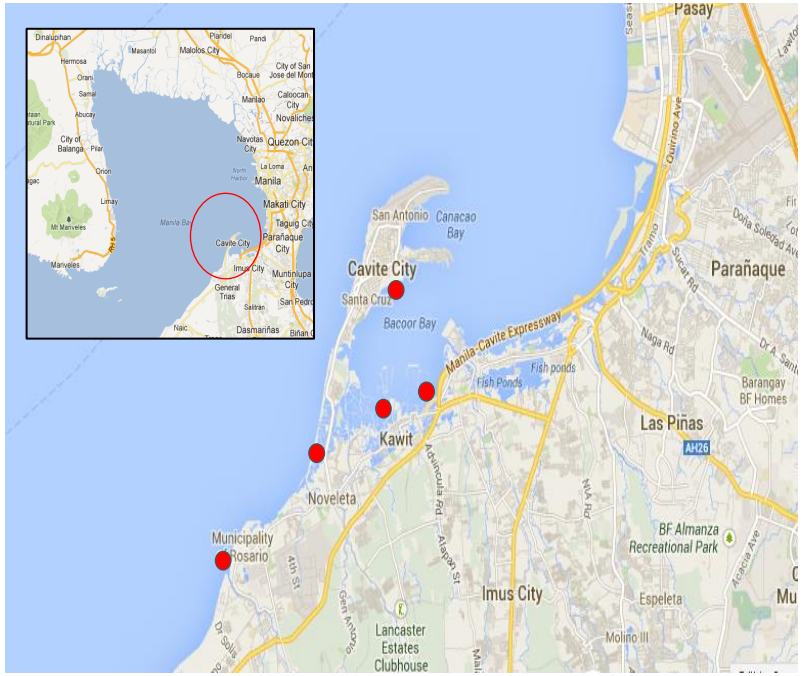
gaseous constituent of the atmosphere, both natural and anthropogenic, that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds.

1. carbon dioxide (CO_2)
2. methane (CH_4)
3. nitrous oxide (N_2O)
4. hydrofluorocarbons (HFCs)
5. perfluorocarbons (PFCs)
6. sulfur hexafluoride (SF_6)

PLANT FOR LIFE PROGRAM

Through its **Plant for Life** Program, Maynilad adopted five sites in Cavite for mangrove rehabilitation





8.6 ha

Total area

87,000

Estimated # of propagules planted from 2013-2016

- **21,287.16** tons of carbon is stocked or captured instead of being released to the atmosphere as CO_2

- **4,247.91** tons CO_2 is sequestered or absorbed from the atmosphere and used for mangrove plant growth instead of contributing to the global GHG

The return of the mud crab and shrimps and the sight of ambulant vendors

- Thank you -