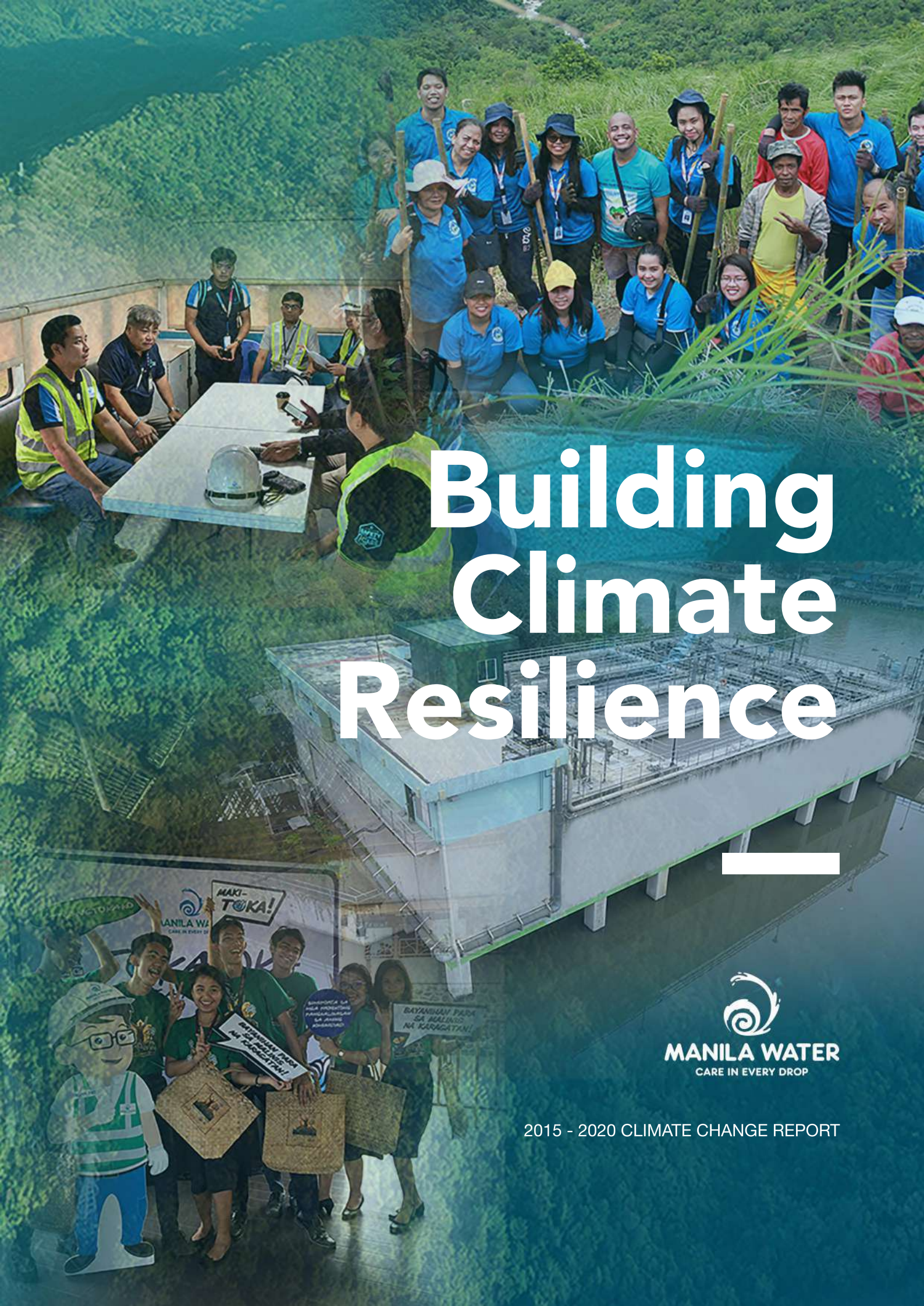


Building Climate Resilience

MANILA WATER
CARE IN EVERY DROP

2015 - 2020 CLIMATE CHANGE REPORT

Table of Contents

Executive Summary

Manila Water's operations in water and wastewater services is intrinsically vulnerable to changes in patterns of the hydrologic or water cycle. Warming temperatures, changes in rainfall and runoff, extreme weather conditions (too much water and too little water) and sea level rise have affected and will continue to affect water supply and quality, as well as the ability of the water and wastewater assets to withstand natural disasters and ultimately could lead to intermittent or long-term failure to serve customers well.

Operational risks driven by climate change prompted the company to formalize a Climate Change Policy in 2007 which has seen a few revisions to align its climate change mitigation and adaptation strategies with national policies and the United Nations Sustainable Development Goals on Climate Action. The company has a commitment to:

- Institutionalize resiliency and adaptation assessment in the planning, construction, operation, and maintenance of all assets
- Retrofit existing assets and build new assets to be climate-resilient
- Strengthen the disaster risk reduction and management capacity of the organization
- Take a proactive role in developing, protecting, rehabilitation, and enhancing water sources, including watersheds, surface, and groundwater resources.
- Continue to undertake climate change mitigation programs.
- Build and enhance the knowledge, values, and capacities of employees, government, customers, supply chain, and other relevant stakeholders on climate change adaptation and mitigation.
- Adopt an inclusive and partnership approach with relevant stakeholders in climate change undertakings
- Continuously monitor, review, assess, improve, and report climate change response initiatives

Each Manila Water business unit targets to have a buffer raw water to provide for the water needs of its service coverage. This is attained through the construction of new water sources either from surface water or groundwater, whichever is feasible. The sustainability of groundwater abstraction is verified through groundwater studies. Manila Water helps in the protection and rehabilitation of watersheds to prevent soil erosion and degradation of raw water quality. Since the start of Manila Water's reforestation initiative, the company planted a total of 1,188,020 trees in its critical watersheds.

Manila Water assessed the vulnerability of its facilities to climate-related events particularly typhoons with more than 220 kph sustained winds, flooding, and El Niño event. The business units' resiliency improvement projects are based on the recommendations of the studies. In addition, Manila Water strengthens its disaster risk reduction and management capacity to ensure immediate recovery and continuity of business operations. The company has a Business Continuity Management Framework consisting of Risk Management, Incident Management and Business Continuity Management.

Through Manila Water's climate change mitigation initiatives, Manila Water supports the Philippines' Nationally Determined Contributions to the Paris Agreement.

The programs include implementing energy efficiency initiatives, using renewable energy, and expanding wastewater coverage to avoid methane generation from septic tanks. The company also undertakes tree nurturing to protect and enhance watersheds and help in carbon sequestration.

To instill awareness and enhance the capacity and capability of the company's different stakeholders, Manila Water regularly conducts climate change and environmental awareness, seminars, forums and summits. Manila Water has programs such as Lakbayan Water Trail, Bawat Patak, Tumatatak Goes to School, Luntiang Lingap, Toka Toka (Amot Amot in its Visayan version), and TSEK ng Bayan to educate and engage the public on environmental protection.

Manila Water commits to further strengthen its programs on climate change adaptation and mitigation to support its climate change commitments. Through climate change adaptation, Manila Water helps build communities to be resilient by ensuring resilient lifeline water and wastewater services. Manila Water will sustain its climate change mitigation initiatives to further reduce its Greenhouse Gas (GHG) emissions.

About the Report

This report is the first publication of Manila Water focusing on its climate change response commitments and performance. It adopts elements from the Task Force on Climate-related Financial Disclosures (TCFD) recommendations for voluntary climate-related financial disclosures to inform and involve the company's different stakeholders.

The report covers the accomplishments of Manila Concession and business units of Manila Water Philippine Ventures that have been operational for at least five years: Boracay Water, Cebu Water, Clark Water, and Laguna Water. The initiatives reported encompasses a 5-year period from 2015 to 2020. This report also reports on some of the 2020-2025 medium-term targets of the business units.

This report does not include information on the operations of newly operational Philippine subsidiaries as well as business units under Manila Water Asia Pacific which operates primarily as a holding company.

We welcome inquiries and feedback on this report.
You may e-mail sustainability@manilawater.com.

MANILA WATER
CARE IN EVERY DROP

About Manila Water

Manila Water Company, Inc. is a publicly-listed company that operates in the East Zone of Metro Manila, other cities and municipalities in the Philippines, Vietnam, Thailand and Indonesia.

Manila Water operations originally covered the Manila East Zone concession which was formed as a public private partnership with the Metropolitan Waterworks and Sewerage System (MWSS) in 1997, providing water and wastewater services to over seven million people in 23 cities and municipalities in the eastern part of the national capital region: Makati, Mandaluyong, Pasig, Pateros, San Juan, Taguig, Marikina, parts of Quezon City, parts of Eastern Manila, and Rizal Province, including Angono, Antipolo, Baras, Binangonan, Cainta, Cardona, Jala-Jala, Morong, Pililia, Rodriguez, San Mateo, Tanay, Taytay, and Teresa.

Manila Water has expanded its operations in other areas of the Philippines through Manila Water Philippine Ventures (MWPV) with subsidiaries such as Boracay Water, Bulacan Aqua Estate, Bulakan Water Calasiao Water, Clark Water, Cebu Water, Estate Water, Ilagan Water, Laguna Water, and Obando Water. Outside the Philippines, the company has presence in Vietnam and Thailand through Manila Water Asia Pacific (MWAP) which holds interests in Kenh Dong Water and Thu Duc Water in Vietnam, East Water in Thailand and and PT Sarana Tirta Ungaran (PT STU) in Indonesia.

Manila Water Total Solutions serves as an incubator of new business opportunities by developing end-consumer and system solutions across the water and wastewater value chain. Manila Water has its own corporate social investments affiliate in the Manila Water Foundation.

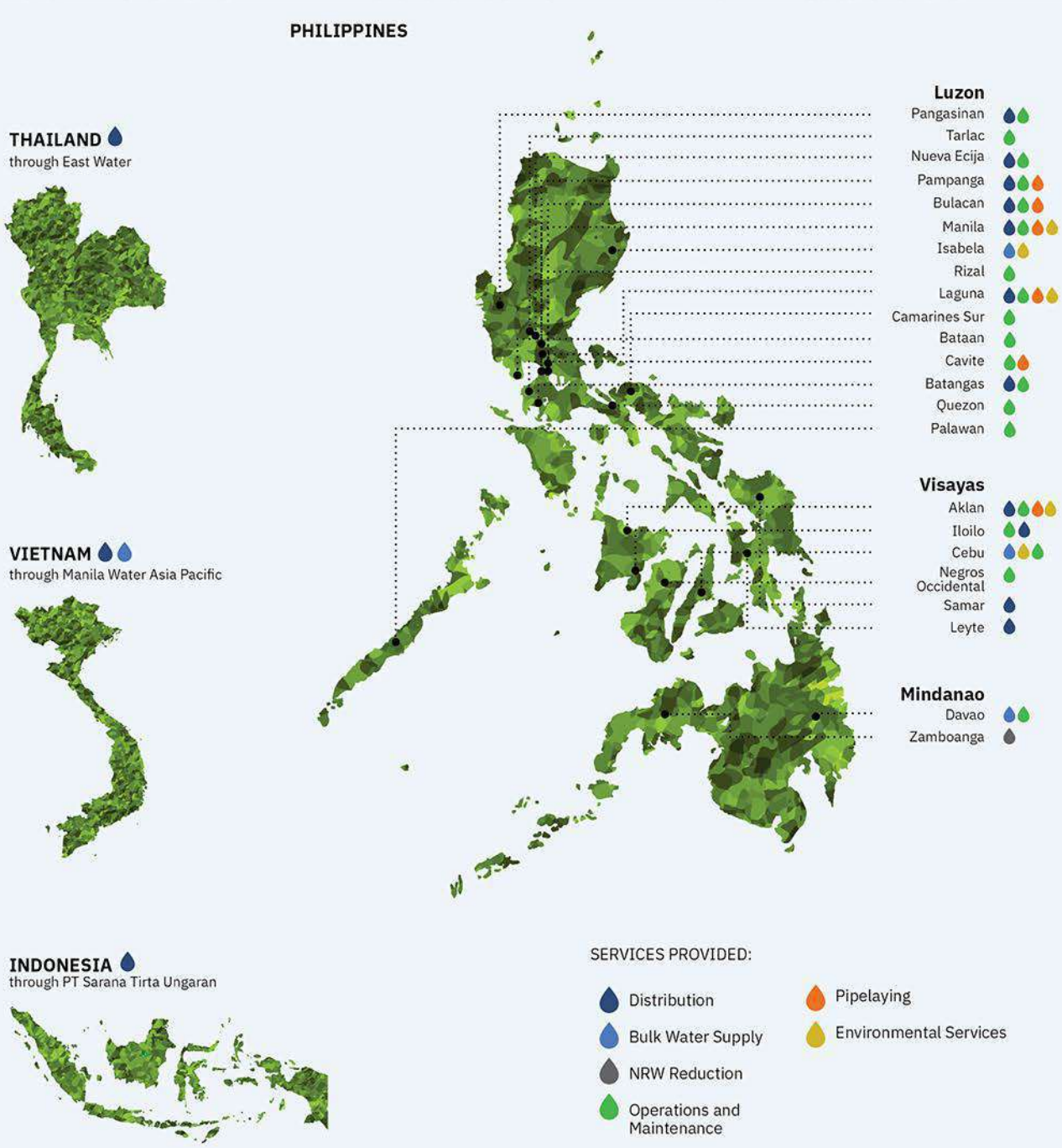
Business Management Structure

Value Chain

Water Source Development and Management » Raw Water Transmission » Water Treatment » Water Distribution » Wastewater Distribution » Other Services

Through concession agreements and joint ventures, Manila Water provides water source development and management, raw water transmission, water treatment, water distribution, sewerage and sanitation services to a broad range of residential, semi-business, commercial and industrial customers across the Philippines and Southeast Asia. Manila Water delivers bulk water to Metropolitan Cebu Water District, Calasiao Water District, Tagum Water District in the Philippines, and Saigon Water Corporation in Vietnam. Estate Water provides operations and maintenance services of water supply and wastewater facilities of property developers. The Manila Water Total Solutions and Manila Water Technical Ventures offers partnerships and technical expertise on non-revenue water reduction, network and technical services, engineering, procurement, construction, management, and technical consultancy in the water and wastewater sectors.

Geographical Presence of Manila Water



Climate Change as a Risk Driver in Philippine Setting

The Philippines, an archipelagic country, is highly vulnerable to the impacts of climate change, including increased frequency of extreme weather events, rising temperatures, extreme rainfall and sea level rise. In the Global Climate Risk Index of Germanwatch, the Philippines ranked fourth with respect to the long-term Climate Risk Index (CRI) for the period of 1998 to 2017.

Acknowledging this climate risks and vulnerability, the Philippine government passed the Climate Change Act of 2009, an act mainstreaming climate change into government policy formulations. It paved the way for the establishment of the National Framework Strategy on Climate Change (NFSCC) and the formulation of the National Climate Change Action Plan (NCCAP) covering 2011-2028.

The Philippines submitted its Intended Nationally Determined Contributions (INDC) in support to the Paris Agreement in 2015. The Philippine INDC is based on the philosophy of pursuing climate change mitigation as a function of adaptation.

The country prioritizes adaptation and adopts it as the anchor strategy as advocated by the NFSCC and NCCAP. The Philippines strives to ensure that climate change adaptation and disaster risk reduction are mainstreamed and integrated into the country's plans and programs at all levels. The path towards a low emission development will require climate resilience and improved adaptive capacity.

In terms of climate change mitigation, the Philippines intends to undertake GHG (CO_2e) emissions reduction of about 70% by 2030 relative to its business as usual scenario of 2000-2030. Reduction of CO_2e emissions will come from energy, transport, waste, forestry and industry sectors. The mitigation contribution is conditioned on the extent of financial resources, including technology development.

Climate Observed Trends and Projections in the Philippines

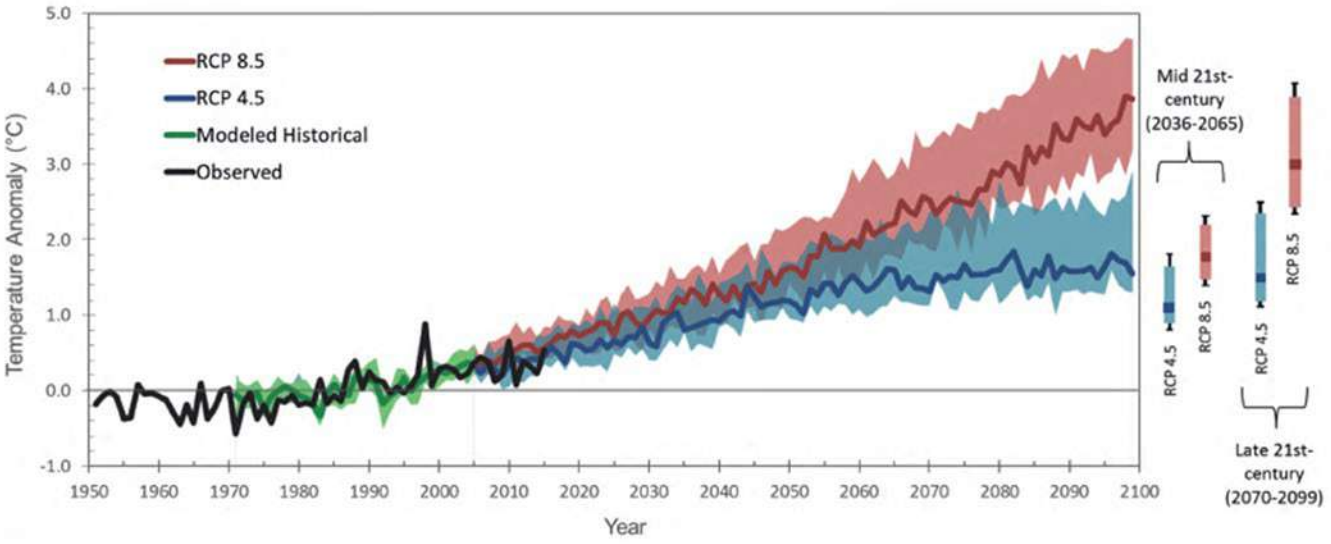
SCENARIO	IPCC RCP SCENARIO	AVERAGE GLOBAL TEMPERATURE RISE BY 2100
Business as Usual	RCP 8.5 (High emission)	About 4°C
Limited Policy Action	RCP 4.5 (Moderate emission)	About 3°C
Paris-Aligned Policies	RCP 2.6 (Low emission) RCP 1.9 (Low emission)	Well below 2°C 1.5 C or below

This section referred to Philippine Atmospheric, Geophysical, and Astronomical Services Administration's (PAGASA's) Observed and Projected Climate Change in the Philippines published in 2018 and the Climate Change in the Philippines published in 2011. Scenarios considered in the projection include Representative Concentration Pathways (RCP) 8.5 and RCP 4.5. RCP is a greenhouse gas concentration trajectory adopted by the Intergovernmental Panel on Climate Change (IPCC).

Changes in Temperature

According to PAGASA, the Philippines' observed temperature is warming at an average rate of 0.1 °C/ decade. Climate projections suggest continuous warming in the future. It is projected that the country-averaged mean temperature could increase by as much as 0.9 °C – 1.9 °C (RCP4.5) and 1.2 °C – 2.3 °C (RCP8.5) in the period 2036-2065.

Time series of projected annual-mean temperature anomalies in the Philippines



(Source: Observed and Projected Climate Change in the Philippines, PAGASA, 2018)

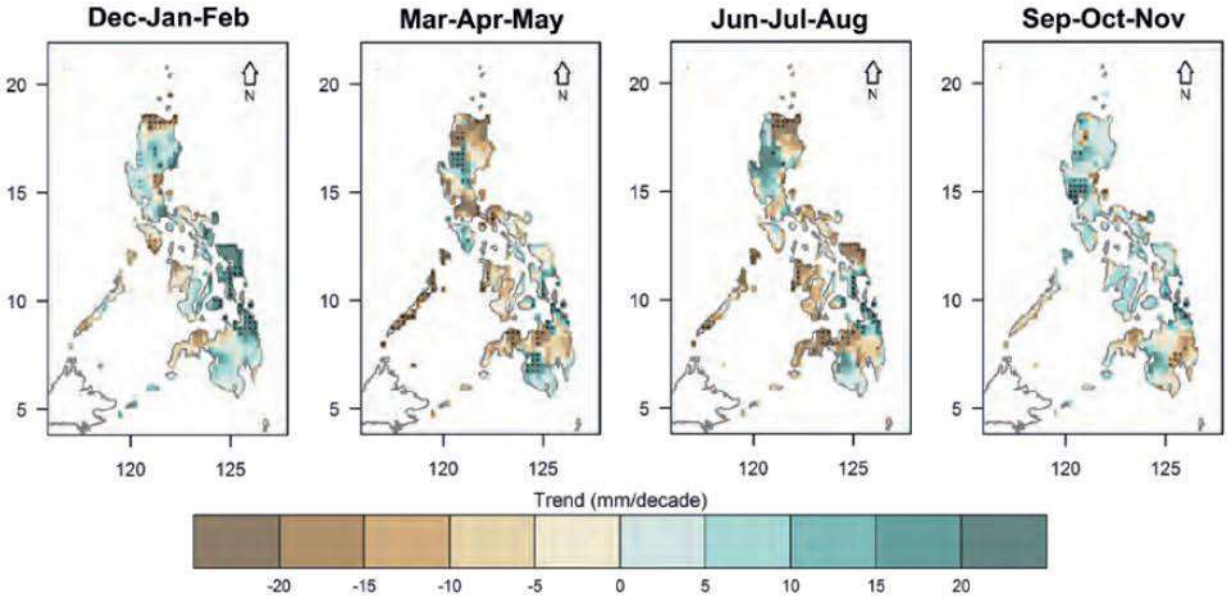
Changes in Rainfall

From 1951 to 2010, the total annual over northern sections of Luzon, Palawan, western sections of Visayas, and central and western sections of Mindanao have declined while increasing trends have been observed in other areas, notably, the central parts of Luzon, eastern section of Visayas, and the northeastern and southwestern sections of Mindanao at a rate ranging from 10 mm/decade to as much as a rate exceeding 40 mm/decade. Such trends were found to be associated with extreme rainfall events.

Rainfall in the Philippines is highly seasonal and varies per region. This trend is shown in the table and figures below.

OBSERVED TREND (1951-2010)	SEASON	REGION
Increasing rainfall	Dec-Jan-Feb (coincides to northeast monsoon season; increased risk flooding potential)	Northeast Mindanao and Eastern Visayas
Increasing rainfall	March-April-May	Central Luzon and Northeast Mindanao
Increasing rainfall	June-July-Aug Sept-Oct-Nov	Southern and Northeastern Ilocos Region; Northeast and Southeast Mindanao
Decreasing rainfall	June-July-Aug Sept-Oct-Nov	Other parts of the country
Drying	All seasons	Northeastern Luzon, Central and Northwestern Mindanao

Observed trends in seasonal total rainfall in the Philippines during the period from 1951 to 2010



(Source: Observed and Projected Climate Change in the Philippines, PAGASA, 2018)

Based on PAGASA's climate change projection, by the mid 21st century the driest possible rainfall change could reach beyond 40% reduction in many areas, particularly over Mindanao. The wettest possible change could exceed a 40% increase in rainfall, particularly over Luzon, western sections of the Visayas, and some parts of Mindanao. The multi-model central estimate future rainfall conditions will be well within its natural variability (i.e. <1 standard deviation of observed rainfall); except for the drier future over central Mindanao in Sept-Oct-Nov and Dec-Jan-Feb seasons, which might require actionable climate change adaptation plans.

Changes in Tropical Cyclones

The number of tropical cyclones (TCs) entering the Philippine area of responsibility and the number of TCs that made landfall shows a minimal decreasing trend from 1951 to 2015. However, there is a slightly increasing trend of very strong TCs with maximum sustained wind speeds exceeding 170 kph from 1980 to 2015. Powerful and deadly typhoons such as Typhoon Ondoy (Ketsana, 2009), Typhoon Pablo (Bopha, 2012), Typhoon Yolanda (Hayan, 2013), Typhoon Ompong (Manghkhut, 2018), Typhoon Rolly (Goni, 2020), and Typhoon Ulysses (Vamco, 2020) made landfall in the country and caused severe damage to infrastructure and agriculture. Many communities were displaced, and several were killed.

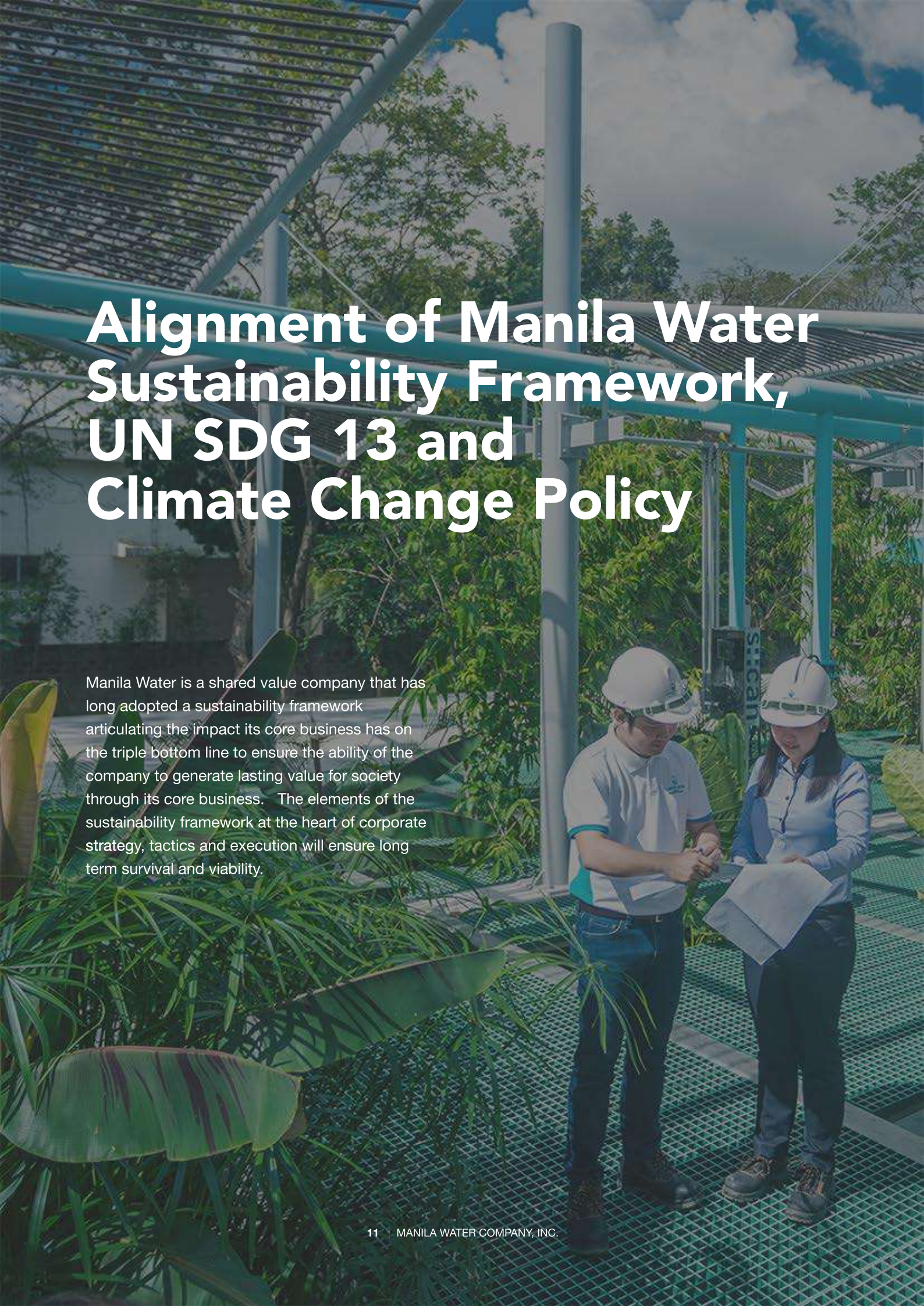
PAGASA' climate change simulations show that the projected changes in the behavior of TCs in the mid 21st century will be consistent with the currently observed trends. This projection is consistent with the IPCC report that in the 21st century, the average annual number of TCs in the Western North Pacific is expected to decrease,

Changes in Sea Level

Based on satellite observations from 1993 to 2015, sea level has risen by as much 5.7 – 7.9 mm/year over the Philippine Sea. This is double the highest global average rate of 2.8 – 3.6 mm/year. Projections show that the country's sea level is expected to increase by approximately 20 cm by the end of the 21st century under the RCP 8.5 scenario. Such projected increase in sea level might worsen storm surge hazards on coastal communities. About 60% of LGUs covering 64 coastal provinces, 822 coastal municipalities, 25 major coastal cities, and an estimated 13.6 million Filipinos are at risks and would need relocation due to sea level rise. (NICCDIES, 2020)

Alignment of Manila Water Sustainability Framework, UN SDG 13 and Climate Change Policy

Manila Water is a shared value company that has long adopted a sustainability framework articulating the impact its core business has on the triple bottom line to ensure the ability of the company to generate lasting value for society through its core business. The elements of the sustainability framework at the heart of corporate strategy, tactics and execution will ensure long term survival and viability.



Manila Water Sustainability Framework

Helping Build Communities

Manila Water provides clean, reliable, and affordable water and wastewater services that contributes to provide public health and economic productivity of all individuals and reduce poverty and inequality. In the course of providing a lifeline service, Manila Water has to ensure that its people, assets and operations are reliable and resilient towards disasters, man-made and natural. Strength in business continuity provisioning translates into the minimization of impacts to customers and the strengthened resilience of communities being served.

Protecting the Environment

Manila Water has a vital dependency on ecosystems services while it renders services to ecosystems. It ensures sustainable water sources through the rehabilitation, protection and enhancement of watersheds and water sources. At the end of the water value chain, the company undertakes wastewater management before returning wastewater back to the environment. The company contributes to climate change mitigation by avoiding emissions of greenhouse gases that would have formed in untreated wastewater.

Safeguarding Health and Safety

Manila Water ensures public health by delivering clean water and warrants public safety by continuously investing in water and wastewater infrastructure. The company meets the national standard for water quality to deliver potable water and provides sanitation services to ensure communities' health and safety. The company also has programs to ensure the occupational health and safety of employees and business partners.

Contributing to Local and National Economies

Manila Water is a key partner in economic growth. In expanding service coverage and providing customers with quality water and wastewater service, Manila Water invests heavily in essential infrastructure, creating jobs and opportunities with the organization and across the supply chain. Improved customer's health arising from water and wastewater services ensures individuals' optimal productivity, which fuels local and international economic growth and helps reduce poverty.

Developing Employees

Developing employees is at the very heart of sustainability in Manila Water. The company invests in developing its people who are equipped with necessary management and technical expertise and manifests the core values of Manila Water. This ensures that the company has a strong pool of competent talents to deliver excellent service to customers and fuel its growth aspirations.

Manila Water's Contributions to the United Nations Sustainable Development Goals

Clean Water and Sanitation

Maintaining universal access and equitable access to safe, affordable and reliable water services and sanitation for all communities across the Manila Water Enterprise, marked by reliable, positive, and exceptional customer service.

The Ayala Group has adopted the SDGs into the heart of its corporate strategy. Manila Water is the SDG 6 Champion in Ayala Group.

Manila Water actively engages in partnerships with stakeholders to realize the various sustainable development goals (SDG 17), supports industry innovation (SDG 9), undertakes climate action (SDG 13), innovates for responsible consumption and production (SDG 12), and executes initiatives to enhance life on land (SDG 9) in order to provide universal access to clean water and sanitation (SDG 6). Through the company's provision of water and wastewater services to all its customers, the company indirectly contributes to reduced inequalities (SDG 10), good health and well-being (SDG 3), sustainable cities and communities (SDG 11) and life below water (SDG 14), and providing decent work and economic growth (SDG8), which ultimately leads to the eradication of poverty (SDG 1).

Climate Change Policy

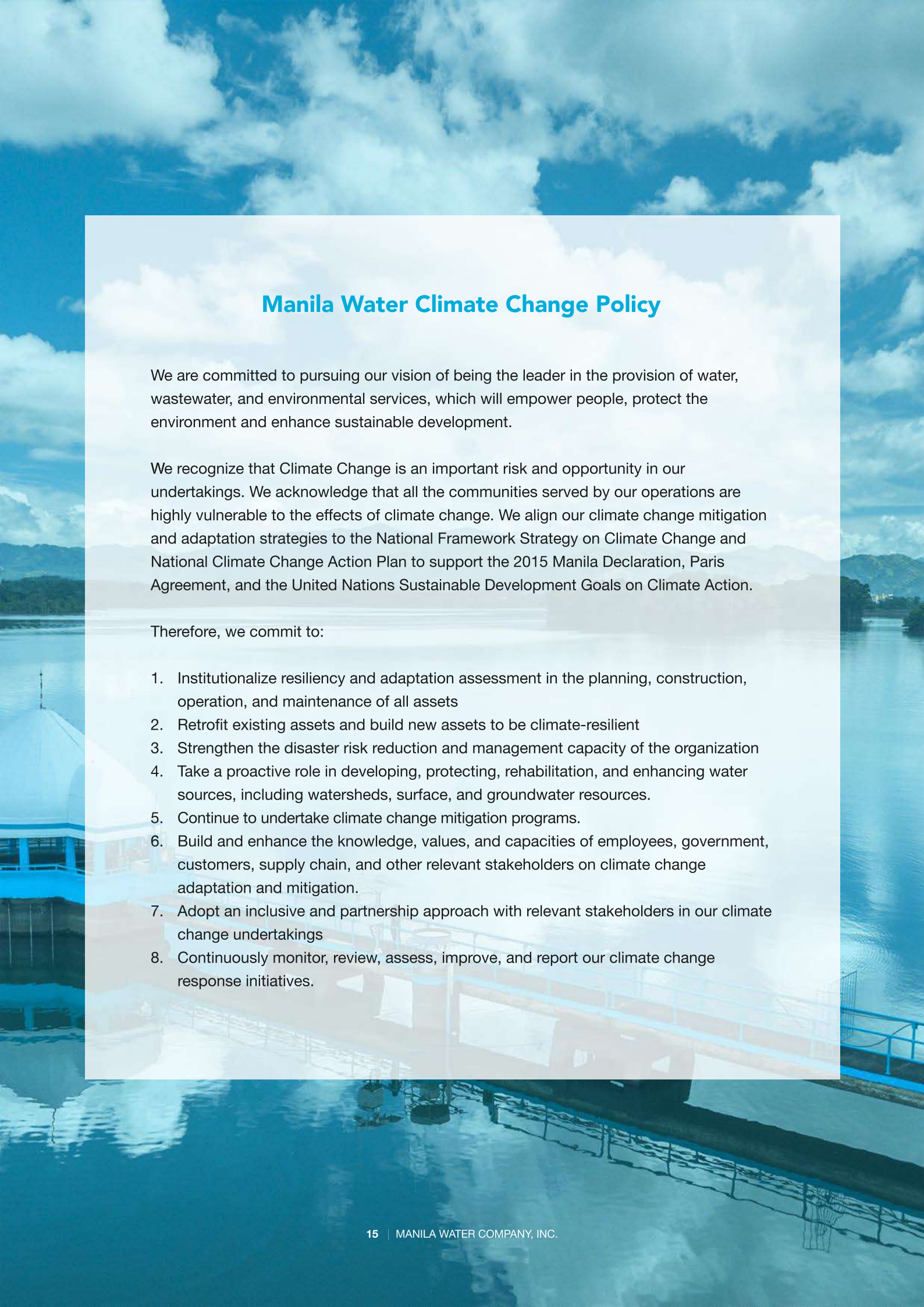
Manila Water, being a water utility is highly affected by the hydrologic or water cycle. Warming temperatures, changes in rainfall and runoff, extreme weather conditions and sea level rise have affected and will continue to affect water supply and quality.

Too much water and too little water both have impacts to the company's operations to provide sustainable and resilient water supply and wastewater services to its customers. A more detailed discussion on the impacts of climate change is in pages 20-22.

These climate-related risks and impacts to the company's operations are the drivers for the company to formalize its climate change commitments. In 2007, Manila Water became the first company in the Philippines to adopt a Climate Change Policy to ensure that the company considers climate change impacts in all its operations. It has stated commitments to both climate change mitigation and climate change adaptation.

To better align the company's Climate Change Policy with the Philippine government's anchor strategy of adaptation as a key response to climate change, Manila Water revised the policy in 2013 to prioritize initiatives on enhancing the climate resilience of assets and operations while continuing its greenhouse gas emissions reduction initiatives. Revisions were also made to highlight emerging operational risks to the company.

The Policy was further revised in 2019 to reflect commitments on proactive water source development and expand climate change mitigation programs to include initiatives other than energy efficiency and renewable energy.



Manila Water Climate Change Policy

We are committed to pursuing our vision of being the leader in the provision of water, wastewater, and environmental services, which will empower people, protect the environment and enhance sustainable development.

We recognize that Climate Change is an important risk and opportunity in our undertakings. We acknowledge that all the communities served by our operations are highly vulnerable to the effects of climate change. We align our climate change mitigation and adaptation strategies to the National Framework Strategy on Climate Change and National Climate Change Action Plan to support the 2015 Manila Declaration, Paris Agreement, and the United Nations Sustainable Development Goals on Climate Action.

Therefore, we commit to:

1. Institutionalize resiliency and adaptation assessment in the planning, construction, operation, and maintenance of all assets
2. Retrofit existing assets and build new assets to be climate-resilient
3. Strengthen the disaster risk reduction and management capacity of the organization
4. Take a proactive role in developing, protecting, rehabilitation, and enhancing water sources, including watersheds, surface, and groundwater resources.
5. Continue to undertake climate change mitigation programs.
6. Build and enhance the knowledge, values, and capacities of employees, government, customers, supply chain, and other relevant stakeholders on climate change adaptation and mitigation.
7. Adopt an inclusive and partnership approach with relevant stakeholders in our climate change undertakings
8. Continuously monitor, review, assess, improve, and report our climate change response initiatives.

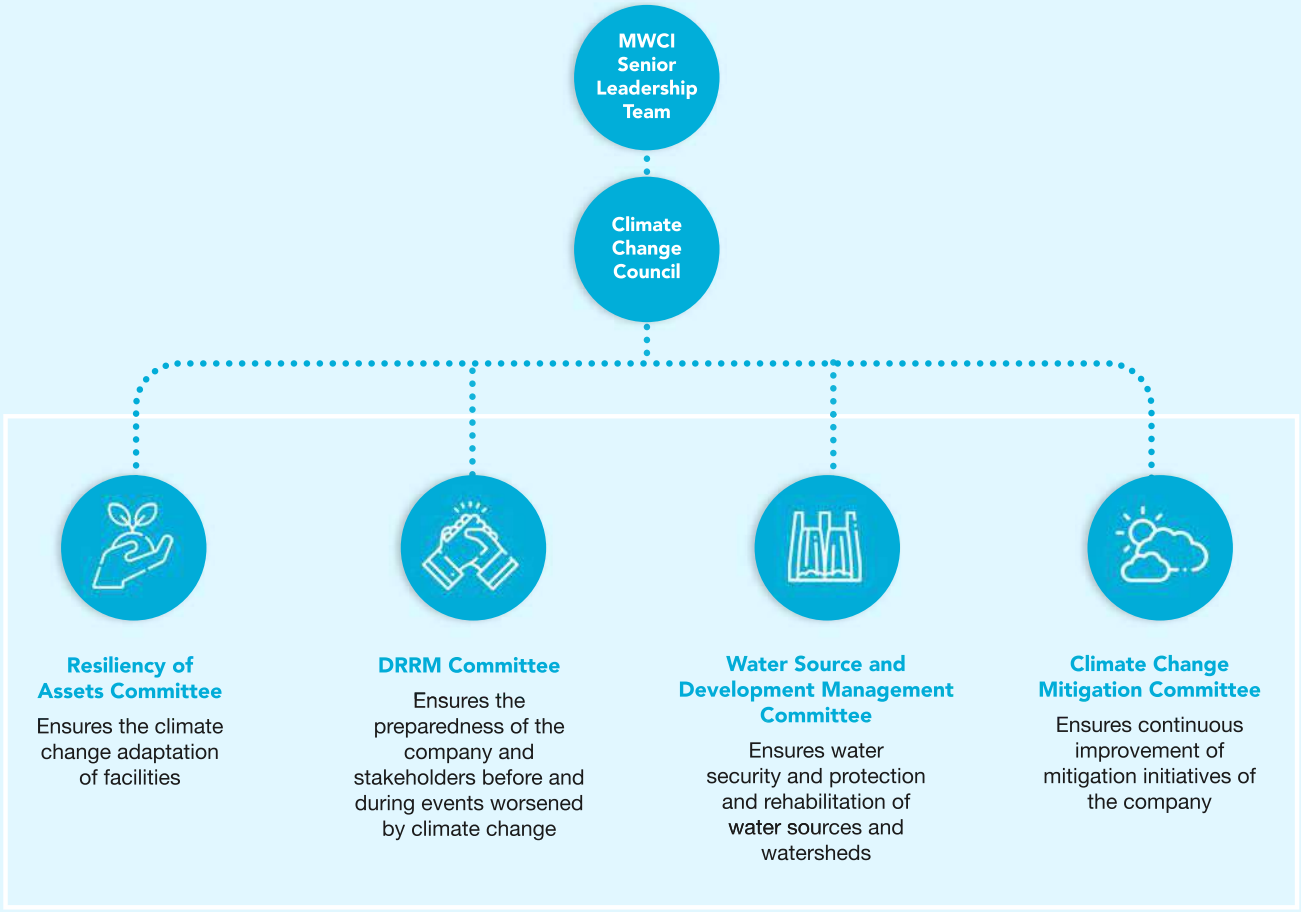
Climate Change Council

To operationalize the Climate Change Policy, a Climate Change Council (formerly Climate Change Committee) was created in 2014, starting as a multi-department and multi-group team from Manila Water Office and Manila Concession. The Council is currently chaired by the Chief Sustainability Officer and participated in by representatives from Enterprise Risk Management and Sustainability functions, Business Continuity, Strategic Asset Management Group, Water Source Department, Compliance and Watershed Management Department and Energy Department. The council eventually expanded to include members from Boracay Water, Cebu Water, Clark Water, and Laguna Water in 2017. Representatives from Estate Water and MWPV Head office representing new business units are the Council's new members in 2020.

The Climate Change Council is tasked to:

- Identify and regularly review the risks and impacts of Climate Change to the enterprise based on different scenarios
- Regularly monitor, validate and review short-term, medium-term, and long-term investment and operating plans and targets aligned to the company's climate change commitments and goals
- Report the climate change risks, strategies, risk management, the status of action plans and targets to the Management/Board and relevant stakeholders
- Review and revise the Climate Change Policy as necessary

Climate Change Council Structure



Enterprise Risk Management and Governance Framework

Manila Water operates in a regulated and dynamic business environment where uncertainties, both detrimental and suitable to the company, abound. The company is accountable to its regulators, shareholders, employees, and customers, among others. Profitability, sustainable development, and corporate social responsibility of the company are expected to be continuously enhanced.

To achieve its corporate objectives, Manila Water recognized the need for the active management of risks inherent to its business, which involves the entire organization.

Manila Water continues to implement its Enterprise Risk Management (ERM) Program based on a globally accepted approach, the ISO 31000:2009. The ERM Program is rolled-out to Manila Water Enterprise, which includes subsidiaries and affiliates in Manila Water Philippine Ventures, Inc. (MWPV), and Manila Water Asia Pacific Pte. Ltd (MWAP) to ensure the attainment of its objectives. Currently, the Enterprise Risk and Sustainability units of the enterprise are integrated.

The ERM process identifies each group and business units' top risks, reviewed and challenged by the ERM department. After this, each group undergoes deep-dive sessions to enhance further and categorize their risk registers. The ERM values the importance of analysis with the active groups to validate, evaluate, and provide risk treatments to the identified top risks. The company's top threats are reported to the Board Risk Oversight Committee (BROC) every quarter. The BROC provides oversight to management functions relating to strategic, financial, operational, compliance, legal, environmental, social, and other risks of the Company. This involves periodic disclosure of significant risk exposures and related risk management activities.

The ERM process has identified the following as two of the company's top risks in which Climate Change is a risk driver:

Water Supply

- Failure to ensure adequacy, security, quality and reliability of water supply.
- Inability to provide customers with 24-hour water with at least 7psi across the service areas

Natural and Manmade Disasters

Failure to ensure immediate recovery and continuity of business operations through execution of a comprehensive business continuity management plan.

The President is the comprehensive risk executive and is ultimately responsible for ERM priorities, strategies, tolerances, and policies. He chairs the Risk Management Executive Committee (RMEC), composed of top management and the Chief Risk Officer (CRO). The RMEC provides oversight and input to the President and the board to formulate better and informed decisions on risks. The RMEC provides direction on the design and implementation of appropriate systems, tools, and methodologies to support the ERM process and other risk management activities and designates owners of specific risks and enablers of the ERM process (ERM Champions/Partners/Risk Officers).

The risk management system of Manila Water is reviewed and assessed annually by the Internal Audit Department using a risk maturity assessment framework aligned with global best practices to determine the system's adequacy, suitability, and effectiveness. Manila Water is subjected to external assessment every three (3) years. Ayala Corporation conducted the last external assessment of Manila Water Company's ERM maturity through Aon Philippines in 2018.

Manila Water Climate-Related Risks and Opportunities

The Climate Change Council conducted a risk and opportunity assessment on the impacts of climate change on Manila Water's operations. The climate change projections of PAGASA were considered in the assessment of the impacts of climate change on the company. Manila Water developed action plans to mitigate the risks and impacts of climate change on operations, stakeholders, and the company. The implemented initiatives from 2015 to 2020 to address these climate risks and opportunities, and the 2020 to 2025 medium-term targets are discussed in the succeeding chapters.

Climate-related Risks and Impacts on Manila Water

INCREASED SEVERITY OF EXTREME WEATHER EVENTS SUCH AS TYPHOONS AND FLOODS

Impacts on Manila Water

- Raw water quality issues due to high turbidity for both dam and deepwells
- Dam spilling causing flood to communities
- Business/operations interruption due to facility and equipment damage
- Increase in capital expenditures due to emergency works and retrofitting of assets
- Increase in operating expenses due to the use of gensets and higher treatment costs
- Employees' inability to report for work due to illness and/or lack of access to facilities and/or employees requiring assistance
- Supply Chain disruption

Climate Change Commitment/Strategy

- Water Source Management
- Mainstreaming Vulnerability/ Resiliency Assessment
- Retrofit assets and build assets to be climate resilient
- Disaster Risk Reduction Management/ Business Continuity
- Partnership and Capacity-building

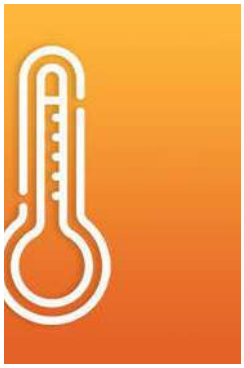
DROUGHT

Impacts on Manila Water

- Water allocation conflicts among users of water resources (e.g. water supply, power generation, irrigation, etc)
- Poor raw water quality due to increase in sediments, microbes, and algae
- Water shortage in the service area
- Lower billed volume leading to lower revenues
- Increase in OPEX due to higher generation costs, water treatment costs, and use of genset

Climate Change Commitment/Strategy

- Water Source Development and Water Source Management
- DRRM/ Business Continuity
- Partnership and Capacity-building



RISING MEAN TEMPERATURES

Impacts on Manila Water

- Higher billed volume due to higher water demand from customers

Climate Change Commitment/Strategy

- Water Source Development and Water Source Management

RISING SEA LEVELS

Impacts on Manila Water

- CAPEX investment for the relocation of facilities in low-lying areas
- Population displacement:
  For low lying areas - disappearance in communities;
  For areas of high elevations - increase in water demand

Climate Change Commitment/Strategy

- Vulnerability/ Resiliency Assessment
- Retrofit assets and build assets to be climate resilient
- Water Source Development and Water Source Management

Climate-related Opportunities and Impacts on Manila Water

ENERGY AND RESOURCE EFFICIENCY

Impacts on Manila Water

- Opportunities for more efficient operation
- Lower OPEX

Climate Change Commitment/Strategy

Operational efficiency initiatives

USE OF RENEWABLE ENERGY

Impacts on Manila Water

- Reduced OPEX
- Reduced exposure to future fossil fuel price increases

Climate Change Commitment/Strategy

Adoption of renewable energy sources where applicable

INNOVATIVE ENVIRONMENTAL SERVICES

Impacts on Manila Water

Opportunity for expansion to new markets

Climate Change Commitment/Strategy

Out of the box innovative solutions for unaddressed pain points

GREEN FUNDS

Impacts on Manila Water

- Availability of CAPEX for water supply and wastewater infrastructures and other environmental services
- Competitive financing scheme

Climate Change Commitment/Strategy

Sustainable Financing Framework of Manila Water

PARTNERSHIPS FOR WATER SUPPLY OPERATIONS, NON-REVENUE WATER REDUCTION, WASTEWATER, DESLUDGING, AND ENVIRONMENTAL SERVICES

Impacts on Manila Water

- New territories for the provision of water and wastewater services
- Improved customer experience

Climate Change Commitment/Strategy

Business partnerships with public utilities, local governments and other private sector players in the water and environmental services sector

Manila Water Climate Change Response

The succeeding articles comprise the climate change commitment/strategy, the risks addressed, 2015-2020 targets, action plans and performance of Manila Concession, and the four MWPV business units that have been in operation for more than five years – Boracay Water, Cebu Water, Clark Water, and Laguna Water. Aside from the performance, each business unit also articulated its future medium-term targets.

This accomplishment does not include new business units that started operation beyond 2016. Succeeding reports will include other MWPV business units that are in operation for more than five years on the time of publication.

Helping Improve Water Security

Commitment

Take a proactive role in the development, protection, rehabilitation, and enhancement of water sources, including watersheds, surface, and groundwater resources

Risks Addressed

- Water Security
- Raw water availability and quality

Opportunities Addressed

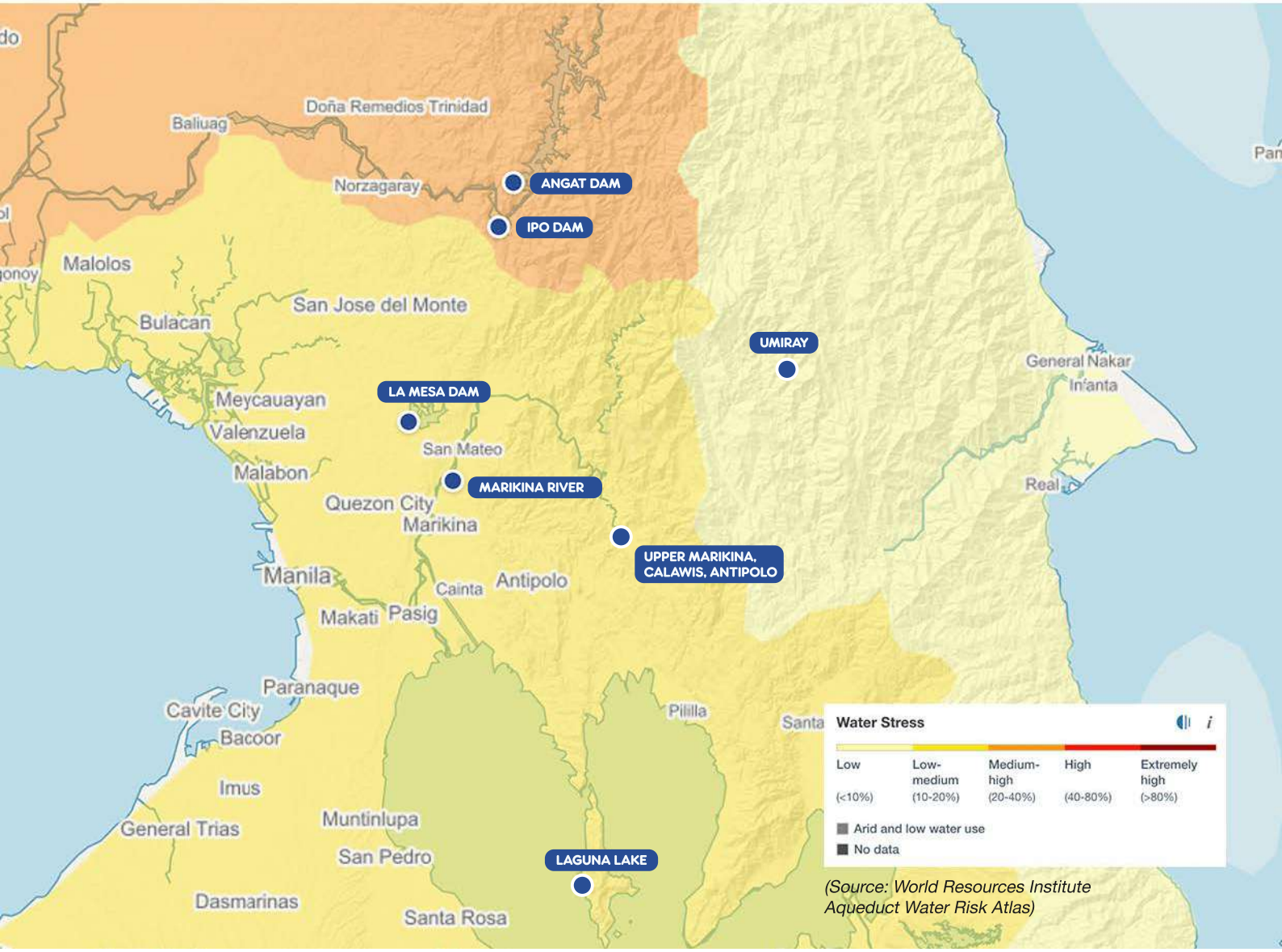
Increasing water demands of customers

Water Sources of Manila Water plotted in the World Resources Institute Water Risk Atlas Map

(Source: World Resources Institute Aqueduct Water Risk Atlas)

Note: Water sources shown are for the Manila Concession, Boracay Water, Cebu Water, Clark Water, and Laguna Water.

Manila Concession Water Sources plotted in the World Resources Institute Water Risk Atlas Map



(Source: World Resources Institute Aqueduct Water Risk Atlas)

2020 Manila Water Capacity vs Water Demand

	RAW WATER AVAILABLE (MLD)	PROJECTED WATER DEMAND (MLD) AS OF START OF 2020	% BUFFER
Manila Concession	1,696	1,883	-11%*
Boracay Water	25	12	52%
Clark Water	50	38	31%
Cebu Water	50	35	30%
Laguna Water	126	82	35%

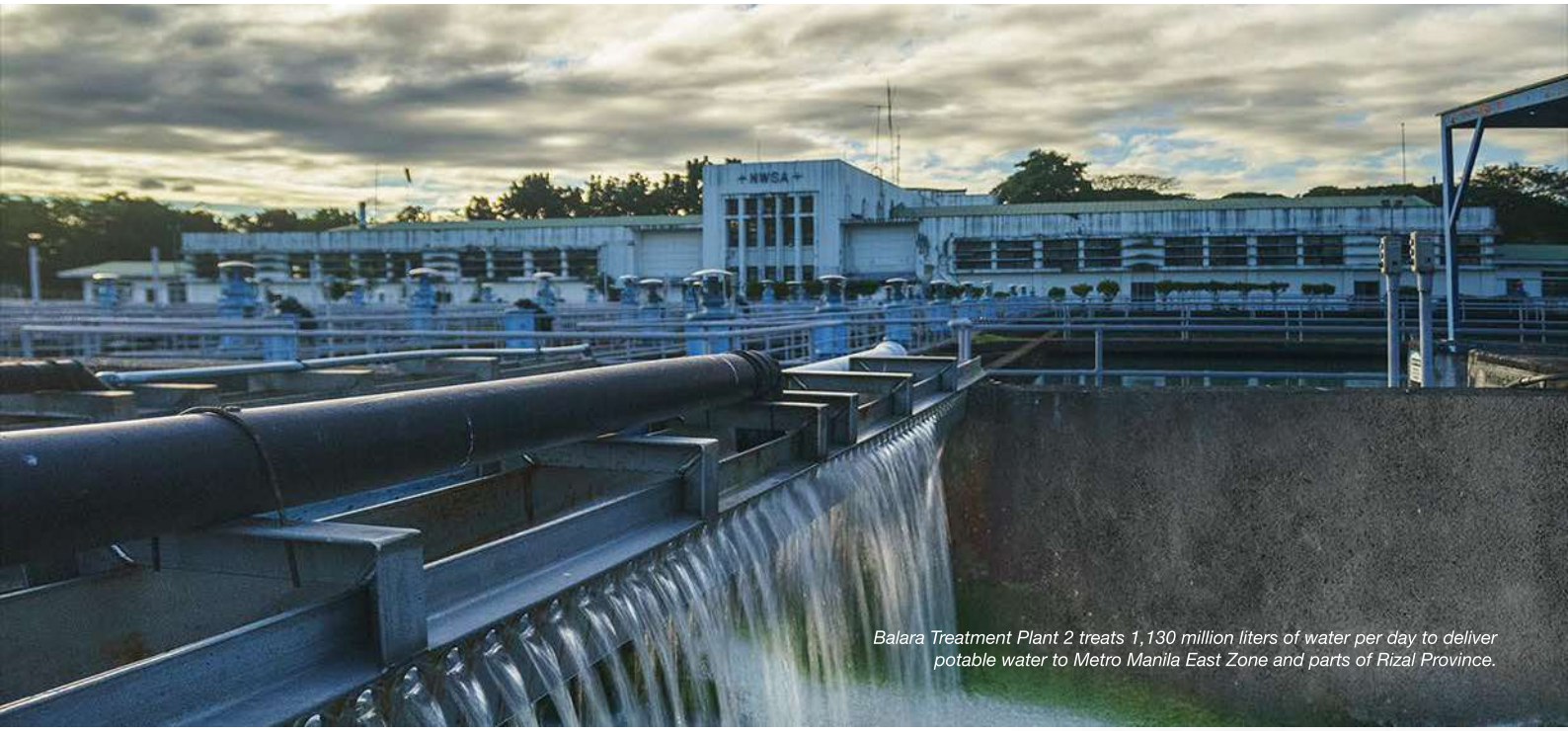
* The Manila Concession is currently undergoing raw water shortage especially during peak demand periods arising from the delayed completion of large-scale new water source development projects of the government water security agency. In the meantime, the concessionaire focuses on developing interim water sources while waiting for the large water sources to be developed.

2015 - 2020 Watershed Accomplishments

	HECTARES PROTECTED	TREES PLANTED
Manila Concession		
General Nakar	18	11,218
Ipo Watershed	6,600	6,285
La Mesa Watershed	2,659	236,991
Upper Marikina Watershed	256	160,000
Boracay Water Nabaoy Watershed	20	7,832
Clark Water	3.5	1,425
Laguna Water		3,500

1,188,020
Total Trees Planted from the start of Reforestation (2006 - 2020)

427,251
Total Trees Planted from 2015 - 2020



Balara Treatment Plant 2 treats 1,130 million liters of water per day to deliver potable water to Metro Manila East Zone and parts of Rizal Province.

Climate Change has significant to water supply both during dry and wet season. These impacts are even worsened by El Niño, La Niña and strong typhoons. To ensure water security and meet the company's service obligations of providing potable water supply 24/7 with the appropriate pressure to its customers, Manila Water takes a proactive role on the development, protection, rehabilitation and enhancement of water sources including watersheds, surface and groundwater resources.

The Manila Concession and MWPV Business Units have masterplans for short-, medium-, and long-term water source development projects to ensure reliable water supply. Manila Water targets to have greater available raw water than the projected water demand of the service area. Another target is to improve the raw water quality from surface water affected by degraded watersheds through watershed protection rehabilitation and enhancement.

Manila Water has identified the following risk drivers that have impacts on the water security of the company:

Risk Drivers on Water Security

Raw Water Availability

- New water sources development and project execution
- Extreme Weather
- Raw water allocations / competing uses of water

Water Quality

- Watersheds condition
- Aquifers condition
- Surface water quality
- Extreme weather

Water Distribution Reliability

- Condition of transmission and distribution lines
- Adequacy of Central Distribution System Design
- Real time situational awareness

Manila Concession

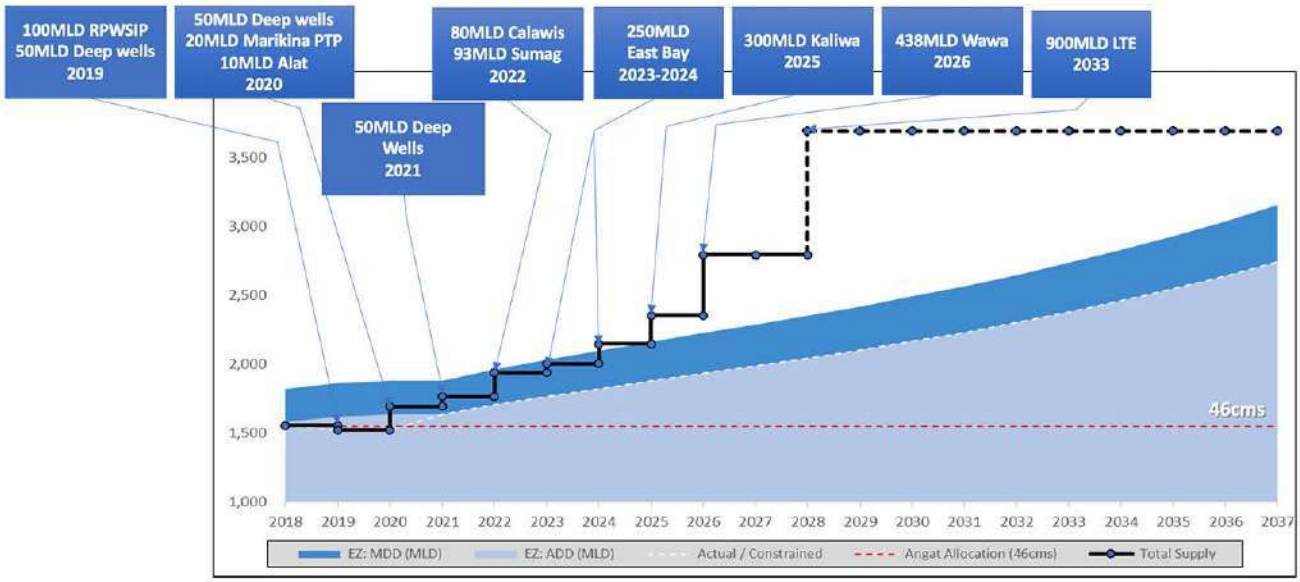
2015 - 2020 ACTION PLANS	STATUS
Develop interim water sources	• Completed Cardona Treatment Plant and activated deepwells • Additional water sources for development
Protect and reforest critical watersheds	• Protected and reforested Ipo, La Mesa, Upper Marikina and General Nakar Watersheds • Planted 260,000 native trees in 506 hectares from 2018 to 2020 surpassing Manila Water's commitment of 500 hectares to MWSS' One Million Tree Challenge • Continuing protection and reforestation

Water Source Development

Manila Concession sources 91% of its raw water from the Umiray-Angat- Ipo and La Mesa resource system located in Quezon, Bulacan and Quezon City to provide water supply to about seven million people in Metro Manila East Zone.

The company conducted feasibility studies to identify potential raw water sources in nearby areas and to craft the Manila Concession Water Source Masterplan. The masterplan contains the proposed short to medium-term raw water sources included in the Rate Rebasing Business Plan submitted to MWSS every five years, the latest of which is in 2018.

MWSS is the water security agency for Metro Manila, Cavite, and Rizal. They have developed a water security plan that includes the completion of 600 million liters per day (MLD) Kaliwa Dam by 2025 and a 1800 MLD Long Term East Source dam by 2033 to cater to customers' growing water demands. The raw water from these dams will be shared equally by the East Zone and West Zone concessionaires.



2018 - 2037 Annual Supply vs. Demand Curve for Manila Concession East Zone Area

* MDD - Maximum Day Demand historically occurring during summer months
** ADD- Average Day Demand also equal to the average daily demand for the year

During summer of 2019, the Manila Concession experienced a deficit of 150 MLD, caused by low rainfall during El Nino in late 2018 to 2019 and high customer demand.

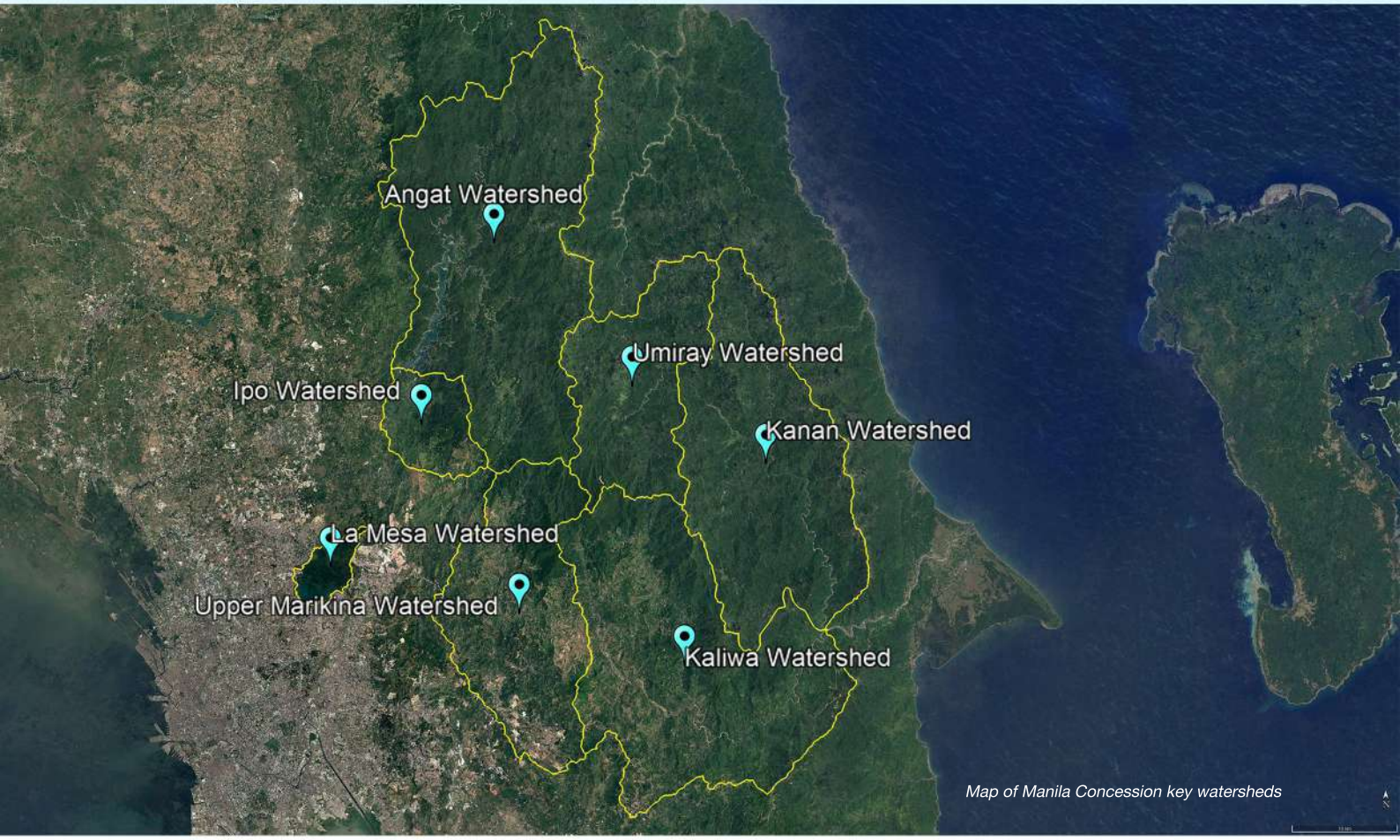
To address the deficit, Manila Water rehabilitated 48 stand-by deep wells and currently constructing 23 new wells to provide a target of 100 MLD of potable water by end of 2020. Foreseeing the potential tapping of groundwater to augment water supply, Manila Water commissioned GHD in 2016 to conduct a groundwater assessment to determine the groundwater availability and sustainability in the East Zone concession area. The different scenarios considered in the model simulation include existing conditions, increased demand of existing groundwater wells, future demands and re-simulation of the three scenarios with 2050 climate change projections. In general, groundwater simulation results show no significant change in groundwater heads over the 40 years simulation period, even with the impacts of climate change since recharge takes years or decades to be affected. Thus, groundwater levels are sufficient until 2055 with the extraction rates approved by the National Water Regulatory Board (NWRB).

Manila Water energized the Cardona Water Treatment Plant in 2019 to supply an additional 100 MLD of potable water through a state-of-the-art technology by abstracting and treating raw water from Laguna Lake. The rehabilitation/ construction of Alat Dam that leads to the La Mesa Dam provided an additional 10 MLD. Manila Water also sourced additional water from the cross-border flow between Maynilad Services and the company with 1.4 MCM water supplied in 2019.

An additional water source under development is the Marikina Package Treatment Plant, which targets to have first water by the end of 2020, supplying additional 20 MLD from Marikina River through the adoption of membrane-based treatment processes. Additional water sources are being developed from aquifer and surface water sources to meet the water demand further.

In 2020, Manila Water undertakes a one-year holistic baselining and monitoring of Laguna Lake Central Bay's water quality and a supplementary water quality treatment works to improve the raw water quality coming from the lake.

Watershed Management



Maps Data: Google, Data SIO, NOAA, U.S. Navy, NGA, GEBCO, Image Landset: Copernicus

Manila Water, in collaboration with MWSS, Department of Environment and Natural Resources (DENR), and other stakeholders, has proactively implemented watershed protection and rehabilitation of General Nakar, Ipo, La Mesa and Upper Marikina watersheds.

Manila Water provides funding to implement watershed protection and management of Ipo and La Mesa watersheds. The management of Ipo watershed is under the joint administration of MWSS and DENR. The intensified forest protection scheme is implemented through 24/7 foot patrolling by 170 Bantay Gubat, composed of Dumagats, the indigenous people in the watershed, apprehension of violators, and establishment of fire breaks. MWSS and DENR have partnered with World Wide Fund for the rehabilitation of 600 hectares.

On the other hand, the La Mesa Watershed Reservation Multi-Sectoral Management Council and its Technical Working Group (composed of MWSS, DENR, the Quezon City local government, Manila Water, Maynilad, and ABS-CBN Lingkod Kapamilya Foundation Inc.- Bantay Kalikasan) oversee the management of the La Mesa Watershed Reservation. Manila Water rehabilitated 250 hectares including 10 kilometers along the riverbank within the La Mesa Watershed from 2018 to 2020 equivalent to 100,000 native forest and fruit tree species and 7,000 bamboo species in support of the Annual Million Tree Challenge Project of MWSS. Maintenance and development of the previously enriched areas are also being undertaken for a maximum of three (3) years upon planting. For the year 2020, a total of 471 hectares planted from 2017 to 2019 are being maintained to ensure survival. Manila Water engaged the ALKFI-BK as its interim partner in managing the protection of the La Mesa Watershed.

For the General Nakar Watersheds, Manila Water entered into a Tripartite Memorandum of Agreement with General Nakar LGU and Maynilad in September 2017 to strengthen the watershed initiatives towards long-term sustainability of Umiray Watershed and future water sources (Kaliwa, Kanan and Agos). Through this partnership, the implementation of the Sustainable Integrated Area Development Project materialized including the deputation of 30 Bantay Gubat patrols to carry out forest protection. Further, community development and watershed protection and enforcement are likewise being undertaken as project components. For the community development, activities such as Information, Education and Communication campaigns, community/IP meetings and dialogues, and other initiatives to reduce human-made pressures on this water source, augmenting the raw water of Angat Dam were conducted.

Sustainable livelihoods were likewise developed for the local communities such as nurseries, communal gardens, organic fertilizer-making, handicraft making, and organic farming including distribution of vegetable seeds and farming tools. The partnership also rehabilitated watershed areas through the planting of 22,436 native forest and fruit tree species from 2018 to 2020.

Manila Water has partnered with the University of the Philippines – Los Banos Foundation, Inc. to prepare the Climate Responsive Integrated Watershed Management Plans (IWMP) for the critical watersheds (Kaliwa, Kanan, Umiray and other minor watersheds) in mainly located in General Nakar, Infanta, and Real in Quezon Province. Part of the plan is a comprehensive assessment of the state of the watersheds, as well as various natural and anthropogenic stressors on the watershed function, with the critical development goals' focus on sustainability along with food security, poverty eradication, healthy ecosystems, human health, peace and order, and climate regulations. The plan will safeguard the watershed from further destruction and exploitation. It will also guarantee its protection and wise utilization hinged on sustainable development goals. Through this, the community will continue to benefit from the watershed economically and socially, among others.

The IWMP includes various strategies and projects focusing on six (6) focal themes: (1) water resources management; (2) biodiversity conservation; (3) disaster risk reduction and hazards management; (4) climate change adaptation; (5) local community development; and (6) institutional linkages and organization structure for watershed management. As of Q3 2020, a Draft Final IWMP for Kaliwa, Kanan, Umiray, and other minor watersheds were already prepared and for the final review and approval of the DENR.

In addition to the 500 hectares equivalent to 353,038 planted native forest and fruit tree species in 2010-2014 at the Upper Marikina Watershed, Manila Water rehabilitated 256 hectares with 160,000 native forest tree species in the Tayabasan Subwatershed in 2019 to further increase forest cover and contribute to the sustainable water supply for the Calawis Water Supply Project. The monitoring and validation conducted in the 256 hectares showed an 87% survival rate of planted seedlings. The company also provided livelihood to the local and indigenous communities being the source of seedlings and as partners on the planting and maintenance activities. Capacity building on forest resource management and sustainable livelihood opportunities were also undertaken. The indigenous people and local migrants residing within the Tayabasan sub-watershed participated in these trainings. Manila Water engaged the Fostering People's Education, Empowerment and Enterprise, Inc. as its partner-implementor and the 11 People Organizations composed of indigenous peoples and local migrants residing within the watershed.

For its 2025 targets, the Manila Concession aims to:

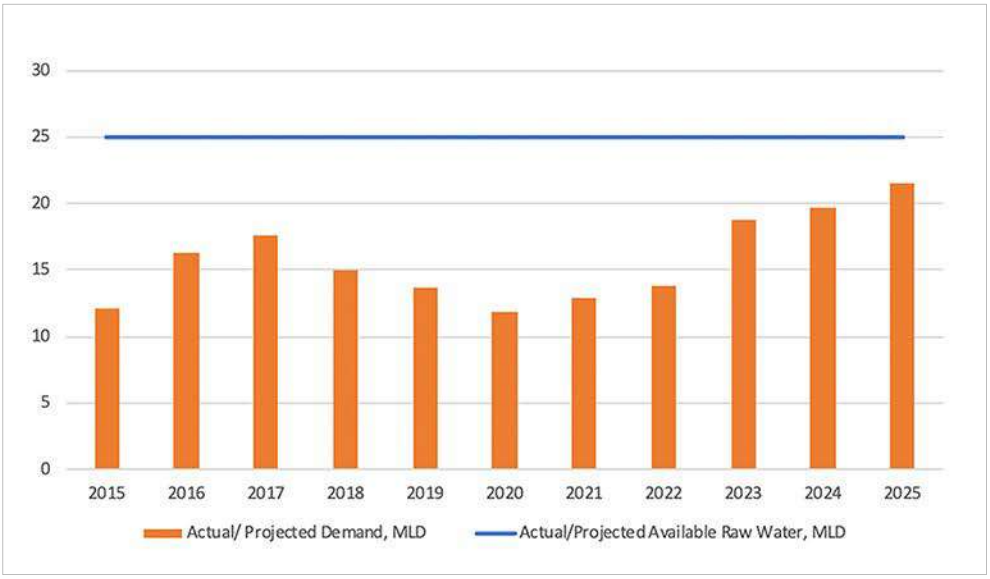
- Secure additional raw water supply to augment the growing supply gap by developing 140 MLD from deepwell and other sources before the start of summer 2021, and completion of the Wawa-Calawis (80 MLD) and East Bay (250 ML
- Rehabilitate and enrich 400 hectares and maintain and develop 990 hectares within the La Mesa Watershed and Upper Marikina River Basin Protected Landscape by the end of 2024.
- Deter illegal activities and protect the watersheds to reduce erosion and minimize turbidity and siltation at Ipo, La Mesa, and General Nakar in cooperation with MWSS and Maynilad, and Upper Marikina by Manila Water alone through the engagement of Bantay Gubat Forest Guards), and ensure the sustainability of current and future water sources for the East Concession Area by the end of 2024
- To utilize nature-based solutions in improving the water quality of the La Mesa reservoir prior to the abstraction of the treatment facility by the end of 2021

The Ipo dam is primarily a diversion dam, bringing water from the Angat and Ipo Rivers to the La Mesa reservoir.

Boracay Water

2015 - 2020 ACTION PLANS	STATUS
Conduct feasibility study of alternative water source	Completed Feasibility Study of Tag-Osip River
Assist in the protection and rehabilitation of Nabaoy Watershed	Memorandum of Agreement with DENR to protect and rehabilitate 40 ha of Nabaoy Watershed Planted 6,132 trees in Nabaoy Watershed and protected the area of trees planted

Water Availability Vs. Projected Water Demand of Boracay Water



** These are projections from the latest rate rebasing exercise of Boracay Water, and do not incorporate the short term impacts of the Covid-19 pandemic which brought tourism in Boracay almost to a halt.*

Boracay Water abstracts water from the pristine and lone source in the Nabaoy River at the mainland of Malay. The potable water from Boracay Water's Water Treatment Plant is supplied to three (3) barangays (Manocmanoc, Balabag, and Yapak) of Boracay Island and the tourists visiting the island. Boracay Water has enough raw water to supply customers' demand until 2025. To meet the increasing water demand on Boracay Island, new water sources with 15 MLD capacity and a pumping station with 7.5 MLD (upgradable to 15 MLD) will be constructed.

In 2018, Boracay Water conducted a feasibility study of Tag-Osip River as a potential raw water source. The river is located at Brgy. Tag-Osip in Buruanga, Aklan, estimated to be 19 kilometers from the Caticlan Water Treatment Plant. Based on the assessment of Boracay Water technical team, the river has a high-water yield. The company will also explore the feasibility of utilizing seawater to provide additional raw water in the coming years.

Boracay Water sustainably sources its raw water from the Nabaoy River in Malay, Aklan.

Boracay Water strongly promotes the sustainability of Nabaoy Watershed through tree planting and rehabilitation. In 2015-2016 the company planted 6,132 trees in a portion of Nabaoy Watershed in Sitio Mananga apart from the 57,500 trees planted in 2013. Through a Memorandum of Agreement, DENR Region VI recently awarded Boracay Water with 40 hectares of watershed to reforest and protect.

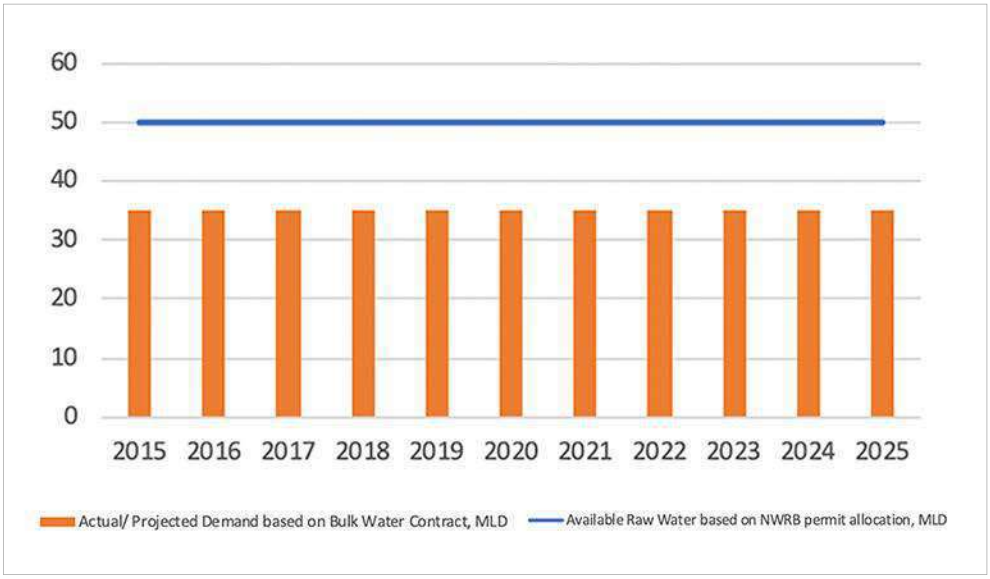
By 2025, Boracay Water targets to:

- Conduct a feasibility study of alternative water sources
- Develop new water sources with 15 MLD capacity and a pumping station with 7.5 MLD (upgradable to 15 MLD)
- Plant additional 50,000 trees in the Nabaoy Watershed
- Rehabilitate and protect additional 20 hectares of Nabaoy Watershed in the next MOA with the DENR

Cebu Water

2015 - 2020 ACTION PLANS	STATUS
Construction of two additional wells with 3 MLD capacity;	On-going construction of the additional wells
Build a sedimentation tank/clarifier to improve the water quality of turbid raw water during high precipitation	Completed the clarifier in 2020
Conduct Luyang River Watershed Characterization Study and develop the Watershed Management Plan	On-going development of the Luyang Watershed Management Plan with key stakeholders

Water Availability vs. Projected Water Demand of Cebu Water



Cebu Water sources raw water from Luyang River to provide 35 MLD of bulk water to Metropolitan Cebu Water District. During high precipitation and strong typhoons, the company encountered high raw water turbidity up to 4,000 Nephelometric Turbidity Units (NTU), which causes disruption of its treatment process. To address this, the company constructed an additional sedimentation tank/ clarifier to remove high concentration of sediments and improve the water quality and meet the requirements of the Philippine National Standards for Drinking Water. Further, Cebu Water completed its Water Safety Plan in 2020. The water safety plan uses a comprehensive risk assessment and risk management approach that encompasses all steps in water supply to ensure the safety of drinking water.

The Cebu Manila Water Foundation commissioned a consultant to conduct Luyang River Watershed Characterization and develop the Watershed Management Plan to provide a sustainable plan to protect, rehabilitate and manage the watershed.

Two additional wells with 3 MLD capacity will also be constructed by 2020 to provide additional water supply.

Cebu Water abstracts raw water from Luyang River, the first large-scale sustainable surface water source in Cebu.

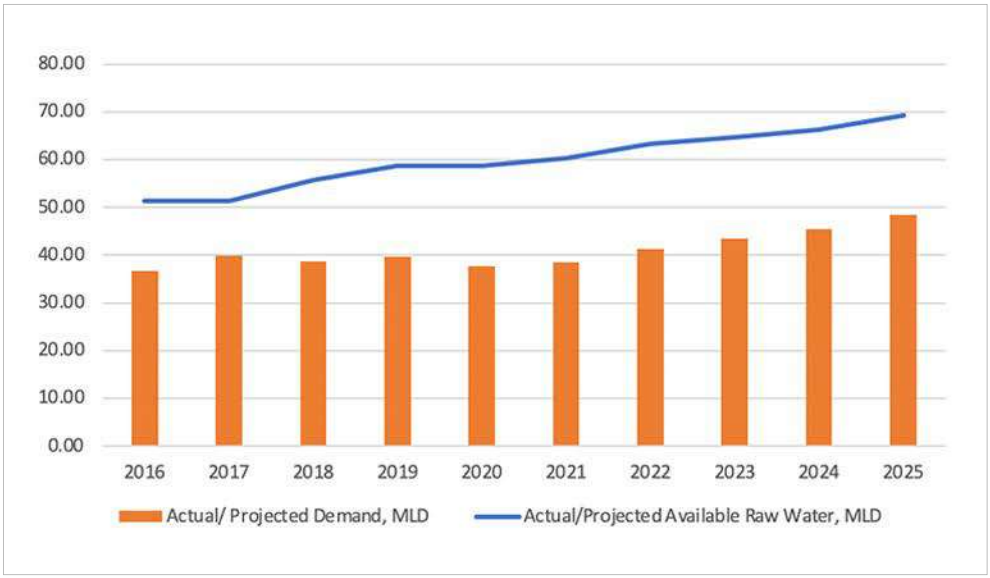
By 2025, Cebu Water targets to:

- Develop projects/solutions that will address water hardness of Luyang river (2021)
- Construct a well-field system for the additional 5 MLD bulk water supply at Municipality of Carmen (2021)
- Complete Carmen River Watershed Characterization and Management Project
- Protect the watershed from water pollution by developing policies to regulate activities in the watershed
- Continue partnership building and watershed management planning

Clark Water

2015 - 2020 ACTION PLANS	STATUS
Conduct groundwater studies	Conducted groundwater study in 2016 Conducted groundwater geo-resistivity study in 2015 and 2020
Conduct feasility study of alternative water sources	Conducted feasibility studies in Sacobia River, Marimla River and Bamban River
Construct additional water sources	Completed five units of water wells in Sacobia River • Five units of water wells along Sacobia River • Two units of water wells along Prince Balagtas • Two units water wells in IE5 Area

Water Availability vs. Projected Water Demand of Clark Water



Clark Water abstracts water from its 37 deepwells strategically located in Clark Freeport Zone (CFZ). In 2016 a groundwater study was completed to update the previous 2009 groundwater study for CFZ and identify locations and available yield of groundwater water sources within CFZ. The groundwater study was completed with geo-resistivity studies conducted 2016 and 2020. The results of these studies were used in Clark Water's master planning activities, including the development of the rate rebasing business plan. Clark Water also completed a groundwater soil study in 2015 to better understand existing water contaminants in Clark that originate from soil formations seeping down to water-bearing aquifers.

Clark Water also conducted in 2015 to 2016 feasibility studies in Sacobia River, Marimla River and Bamban River to explore surface water sources for the medium to long-term water requirements of CFZ. Based on the studies, Sacobia River can provide a minimum 20 MLD through riverbed infiltration while Marimla River can provide 13.5 MLD without impoundment or 45 MLD with an impounding dam.

Clark Water ensures adequate water supply to the industries, residents and tourists of Clark Freeport Zone.

The raw water from Marimla River requires conventional water treatment based on water quality tests. Dependable flows for Bamban River is 53 MLD. Water quality test results though, show that the treatment process required involves a conventional process with reverse osmosis.

Clark Water maintains a buffer of 20% of water demand to ensure adequate water supply. From 2016 to 2017, Clark Water completed five units of water wells tapping supply from Sacobia River with depths of 100 to 120 meters and with estimated flows of 1.0 to 1.5 MLD per well. As of 2020, only three (3) out of the five (5) Sacobia water wells are currently operational. The other two (2) wells are shut down due to water quality issues on iron & manganese. Additional two deepwells were constructed along Prince Balagtas Avenue in 2015 and another two deepwells were constructed in the Industrial Estate 5 Area in 2017. Clark Water is currently constructing another two deepwells in 2020 to supply more water to CFZ.

In 2020, the company signed a Memorandum of Agreement with DENR's Provincial Environment and Natural Resources Office for the Adopt-a-Watershed program. The program aims to plant and maintain 7,200 seedlings in a 16 hectare area in Barangay Villa Maria, Porac, Pampanga through the assistance of the People's Organization in the area.

By 2025, Clark Water targets to:

- Update the Water Source Feasibility Study
- Provide additional 18 MLD from future water sources
- Construct 2 ML storage facility

Laguna Water

2015 - 2020 ACTION PLANS	STATUS
Groundwater Study every four years	Completed 2016 groundwater study, On-going 2020 groundwater study
Construction of Laguna Wellfied and its Network lines	96% completed (22 deepwells and 4 reservoirs)
To improve water quality and pressure	100% completion by 2021
Finalization and approval of Plan for the increase in capacity of Matang Tubig Spring (MTS Surface Water Source)	On-going negotiation with current Water Rights holders.

Water Availability vs. Projected Water Demand of Laguna Water

To fulfill Laguna Water's commitment of providing the Province of Laguna with quality and reliable water supply with 24/7 water availability and adequate pressure, the company operationalized the Laguna Wellfield in 2016. It is one of the country's largest groundwater facilities composed of 22 deepwells and four (4) 5ML reservoirs. The centralization of the water distribution system simplifies the operation workflow. It helps in decommissioning individual deepwells and limits water extraction in one location. It also ensured consistent water quality and pressure.

Laguna Water conducts groundwater study every four years since 2012. The company commissioned the Diliman Integrative Technical Consultancy led by Dr. Guillermo Q. Tabios III to conduct the 2012 groundwater study, covering San Pedro-Binan-Sta Rosa-Cabuyao-Calamba. The study aimed to locate aquifer rich locations for Laguna Wellfield and simulated deepwell extraction vs projected demand until 2090. The study identified seven aquifer rich wellfield sites, which included the site of Laguna Wellfield. The simulation showed that groundwater in the covered areas is sufficient until 2090.

In 2016, Laguna Water expanded the groundwater study to cover the whole province of Laguna. The study, entitled Masterplan for Water Resources Development in the Province of Laguna, identified aquifer rich locations in the expansion area suitable for deepwell construction.

The company commissioned another groundwater study for the Province of Laguna in 2020 to validate the 2012 and 2016 study. This on-going study covers the effect of the 'Big One' or the possible West Valley Fault 7.2 earthquake to aquifers, the impact of Laguna Wellfield 100 MLD extraction to downstream aquifers, and the effect of adding a new Laguna Wellfield (Laguna Wellfield 2) 60 MLD extraction to the aquifer. The result of the study is expected to be finalized by 2021.

By 2025, Laguna Water targets to:

- Upgrade Matang Tubig Spring source, the only surface water source of Laguna Water, from 6 MLD to 25 MLD capacity to secure the supply requirement from 2024-2035
- Decommission low-yield deepwells and start the optimization of deepwells to meet the available target supply of 211 MLD by 2035

Laguna Water sources raw water from the Matang Tubig Spring and groundwater.

Building Climate-Resilient Assets

Commitments

- Institutionalize resiliency and adaptation assessment in the planning, construction, operation, and maintenance of all assets
- Retrofit existing assets and build new assets to be climate-resilient

Risks Addressed

Damage of equipment and facilities and operation shutdown due to typhoon, flooding, storm surge, and landslides

The Philippines, located in the typhoon belt, is one of the most susceptible countries to hazards brought about by climate change. The country experiences an average of 20 typhoons in a year, five of which are destructive. According to the PAGASA's Observed Climate Trends and Projected Climate Change in the Philippines, there was a slight decrease in the number of tropical cyclones and a minimal increase in the frequency of very strong tropical cyclones (exceeding 170kph) in the past 1951 to 2015. These trends are projected to continue in the future.

The high year-to-year variations in the frequency of occurrence and intensity of tropical cyclones remain to be dominant in the future Philippine climate conditions. Likewise, rising sea level rise will worsen storm surge hazards in coastal communities.

Proactively, Manila Water commits to conduct vulnerability or resiliency assessments of facilities, retrofit existing assets, and build new assets to be climate-resilient to ensure continuous water and wastewater services to customers.

Manila Concession

2015 - 2020 ACTION PLANS	STATUS
Conduct Vulnerability/Resiliency Assessment of Facilities	• Completed Resiliency and Business Interruption (RBI) Study Phase 1 in 2017 and RBI Study Phase 2 in 2019
Develop resiliency projects based on the RBI Studies and include in the 2018 Business Plan for approval of MWSS	• Completed in 2018
Implement resiliency projects	• On-going retrofitting of facilities • Constructed eight (8) emergency reservoirs

Resiliency and Business Interruption Study

Manila Water commissioned Jardine Lloyd Thompson Insurance Brokers in 2016 to conduct a vulnerability/resiliency assessment entitled the Resiliency and Business Interruption (RBI) Study (Phase 1). It covered all Manila Concession facilities to determine the impacts of natural calamities on the operations and ensure its continuity of service to the customers.

The study conducted a full risk assessment of Manila Water's operations based on pre-defined risk events and to ensure that the impacts of these risk events are properly addressed with a focus on asset resiliency, business continuity, and insurance (property and business interruption) as the main risk management strategies. The climate-related events considered were typhoons with more than 220 kph sustained winds, flooding due to 180-year rainfall event, and El Nino event (with at least a 2.5 ONI – worst case scenario).

Resiliency and Business Interruption Methodology

Vulnerability Assessment
How much is vulnerable?

Asset Valuation
How much is the total assets?

Business Interruption
How much is revenue loss?

Natural Calamity Adaptation
How long to recover?

The study assessed the extent of Property Damage (PD) and Business Interruption (BI) duration to operations for each facility and the entire system. It also determined the financial losses that might be incurred due to the shutdown of operations. The PD and BI losses were determined using commercially available risk models.

Assessed Property Damage and Loss of Revenue

NATURAL CALAMITY	PROPERTY DAMAGE	LOSS OF REVENUE
Signal No. 4 typhoon that has more than 220 kph sustained winds	PHP 218 million	PHP 13 million
Typhoon-induced flood 180-year flood	PHP 26 million	

Note: Figures were based on available information as of the date of the study

The exposure assessment highlights the dependency that Manila Water has on the above-ground facilities. Other than East La Mesa Water Treatment Plant, the locations most at risk from windstorms are support facilities. While the locations most at risk to flooding are treatment and pumping stations of both water and wastewater. The underground infrastructure, such as tunnels and distribution mains, is anticipated to be relatively less exposed and, therefore, likely to suffer lower losses.

All insurable assets have adequate insurance coverage. It is deemed to be sufficient to cover losses since it is based on reproduction (replacement) cost. There is also a business interruption cover which protects the company's revenue during business disruptions from material damages from the assets. Underground assets are not insured since there is currently no insurance product to cover this.

The Business Interruption (BI) Indemnity Period of Manila Concession is designed based on the Maximum Foreseeable Loss of a 7.2 magnitude earthquake due to West Valley Fault (worse-case scenario). The current BI Indemnity Period is 17 months. The current Private Industrial All Risks Policy will respond to BI loss due to damages not only to private/built assets but also to any Government Assets and Common Purpose Facilities via its Interdependency Clause. Existing "all risk"protection already covers flooding, typhoon and earthquake scenarios.

Based on the study, El Niño could have a considerable impact on operations, and the next mega event is within a 15-20 year period (2030-2035). For El Niño, the likelihood of occurrence is more variable, but the potential impact could be considerable. There are limited options other than developing alternative water sources and being fully prepared to deal with long-term drought.

In addition, the RBI Phase 1 study has provided the following pre-loss options to minimize the impacts of these natural events:

Existing Facilities and Equipment

- Review and undertake recommended structural improvements at facilities
- Review equipment capabilities / alternate capabilities/maintenance schedules
- Determine reinstatement times and develop a provisional asset recovery plan
- Store temporary facilities materials
- Review spare parts requirements/buffer stock
- Review asset locations and off-site storage capabilities

Alternates

- Identify alternate water sources (deep wells, other reservoirs, competitors, other locations, etc.)
- Determine potential "safe havens" where staff can work

- Review contractual obligations (existing)
- Review and agree on alternate providers

Insurance Coverage

- Review current coverage and enhance in line with recommendations

Business Continuity

- Develop Windstorm / Typhoon and Flood Emergency Response Plans (location specific)
- Test and train relevant staff in new plans
- Determine supplier capabilities and their contingency activities
- Determine Utility providers' capabilities and their contingency activities (gas, electricity, telecoms, etc.)

Manila Water developed asset improvement and natural calamity mitigation plans based on the RBI Study Phase 1 recommendations.

The Phase 2 of RBI Study was conducted in 2018 to 2019 by Marsh Risk Consulting to assess and quantify the asset improvement plans' effectiveness in reducing the risks of physical damage and business interruption following the impact of natural calamities. The study also quantified the net reduction in loss exposure.

Loss Exposure Reduction of Climate-related Planned Asset

YEAR	ASSET IMPROVEMENT	LOSS EXPOSURE REDUCTION, PHP
2023	2023 Typhoon mitigation improvement through reinforcement of structures, windows and steel doors (2019-2021) in 18 facilities	17,225,080
	Flood mitigation through the improvement of drainages, elevation of equipment and controls (2019-2021) in 18 facilities	66,165,509

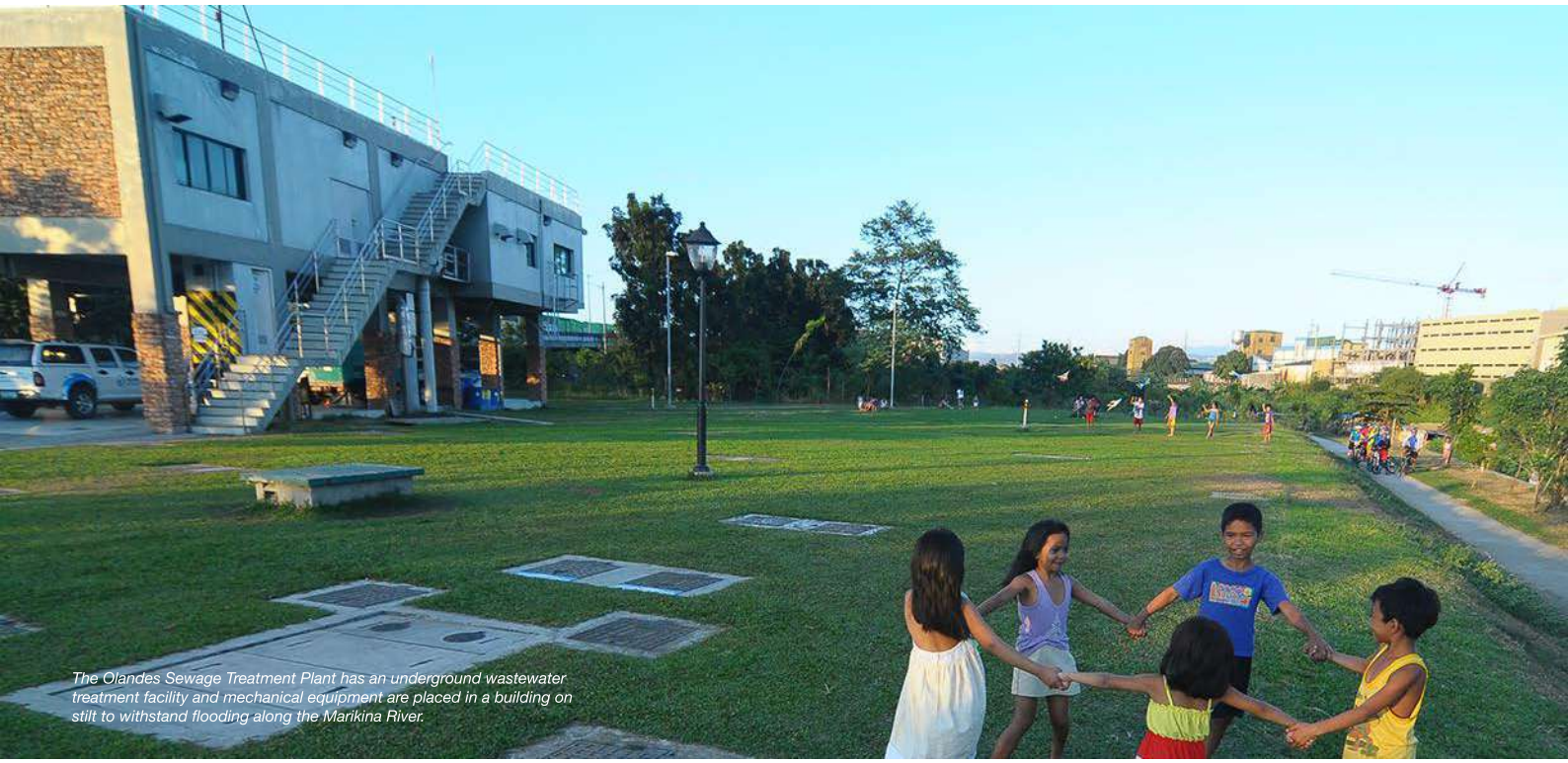
Note: Figures were based on available information as of the date of the study

The study has identified which facilities will have significant benefit from reinforcement and will incur loss exposure reduction. For typhoon reinforcement, old facilities such as Balara Treatment Plant (BTP) 1, BTP 2, Balara Pumping Station (PS), and San Juan PS provide the most substantial property damage reduction. Other newer facilities are not expected to benefit significantly since their roofs, cladding, and windows are already designed to a relatively good standard.

Among the enhancements planned to mitigate the flood exposure, elevating critical controllers and electrical panel is the most effective.

The only drawback to this is that other equipment and contents that are not raised will still suffer flood damage. Thus, the reduction in asset damage will be due to the unaffected controllers and electrical panels. The disruption to operation can be decreased slightly.

The study provided additional opportunities for improvement to enhance the resiliency of the facilities.



The Olandes Sewage Treatment Plant has an underground wastewater treatment facility and mechanical equipment are placed in a building on stilt to withstand flooding along the Marikina River.

Resiliency Improvement Projects

Manila Water has conducted structural retrofitting/reinforcements works, seismic joint installation, and emergency on-line reservoirs for different facilities such as La Mesa, Balara, and San Juan as part of flood resiliency. For other facilities, consideration on the design, height and materials are being regarded to make it a flood-free facility. Adjustments were made after Typhoon Ondoy at the Olandes Sewage Treatment Plant, which is located beside the Marikina River.

Manila Water implemented the following key climate-related asset improvement projects from 2015 to 2020:

- Balara Treatment Plant 1 and 2 Sedimentation Basin Retrofitting and Upgrade
- San Juan Reservoir rehabilitation
- Construction of Emergency Reservoirs

Balara Treatment Plant 1 and 2 are being upgraded and retrofitted to improve the structural stability of the facilities.

The sedimentation basin capacity is also being upgraded to ensure compliance to water quality standards and continuity of supply amidst the possible occurrence of natural calamities.

The San Juan Reservoir with a 56 ML capacity is undergoing rehabilitation to ensure that the reservoir can withstand a 7.2 magnitude earthquake and maintain continuity of water supply services to its influence area during natural calamities.

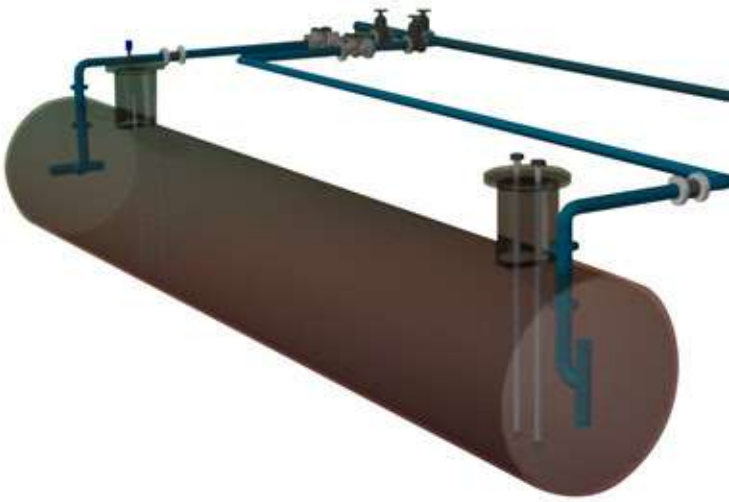
Manila Water constructed emergency reservoirs to augment the current static tanks, water tankers, and mobile treatment plants used in emergency response in the provision of potable water. The emergency reservoirs, which are interconnected to existing lines will be used for flood, typhoon and earthquake contingency. They have capacities of 50 cubic meters (m^3) and 100 m^3 that can serve 5,000 and 10,000 evacuees for three days, respectively.

As of 2020, there are eight completed emergency reservoirs located in the following evacuation centers:

LOCATION	CAPACITY (M^3)
Aguinaldo Elem. School, Quezon City	50
Amoranto Sports Complex, Brgy. Paligsahan, Quezon City	100
Cainta Elem. School, Brgy. Quirino 2-B, Quezon city	100
Mayamot Elementary School, Brgy. Mayamot, Antipolo Rizal	50
Pinyahan Elem. School, Quezon City	50
Project 6 Elem. School, Quezon City	50
Quirino Elem. School, Brgy. Quirino 2-B, Quezon city	50
San Juan Elem School, Brgy. Rivera, San Juan City	50

Manila Water identified additional locations for the construction of emergency reservoirs. These are in Sto. Rosario Elem School in Pateros (50 m^3), and Felix Memorial National High School in Cainta (50 m^3), and Rodriguez Evacuation Center in Rodriguez, Rizal (50 m^3).

Design of an emergency reservoir



2020 - 2025 medium-term action plans:

- Develop resilient climate standards for new assets
- Include subheadline for drought under natural calamity contingency and mitigation headline in the Rate Rebasing 23
- Accomplish rehabilitation of three (3) deep wells, four (4) pipe retrofitting, and two (2) water supply projects

Boracay Water

2015 - 2020 ACTION PLANS	STATUS
Vulnerability/Exposure Assessment of Boracay Water facilities – Flood	• Completed in 2018
Retrofitting of facilities to be climate-resilient	• Retrofitted facilities • Other resiliency projects are on-going

Typhoon Urduja

On December 17,2017, Typhoon Urduja hit the province of Aklan. Widespread flooding was experienced in the province especially in Boracay Island. Other than the residents and tourists, the impact was also experienced by Boracay Water facilities such as its lone water source, Nabaoy River Intake, and island facilities.

Flood Vulnerability Map of Boracay Water to Typhoon Urduja 2017

Vulnerability Assessment and Mitigation Measures

In 2018, Manila Water commissioned a study on flood vulnerability to identify vulnerable facilities and provide mitigation measures. Based on the exposure assessment for Boracay Water facilities, Pinaungon, Bolabog and Bantod Pumping Stations were identified as most vulnerable to flooding. Simple flood mitigation controls, such as sandbags and raising of controls were incorporated to the existing emergency preparedness and response (EPR) procedures.

Boracay Water upgraded Pinaungon PS by elevating generator sets, Motor Control Center and other electromechanical equipment to address the flood risks. For the two pumping stations, Boracay Water is depending on the drainage system improvement of the Tourism Infrastructure and Enterprize Zone Authority for the island.

During strong typhoons, raw water coming from Nabaoy River is turbid, causing interruption in water treatment operations. In 2017, Boracay Water constructed a glass-fused steel bolted reservoir with 5 ML capacity that can store treated water for additional 8 hours. This provided the reliability of water supply during peak demands and natural calamities.

The Manoc Manoc Sewage Treatment Plant, the second wastewater facility of Boracay Water, is designed to be climate and earthquake resilient.

In 2017, the company rehabilitated Bulabog outfall, the pipe of treated wastewater, with a full replacement of 800 meters submarine pipeline with a stronger HDPE pipe to make it withstand strong current and waves. This is key to the continuous operation of Balabag Sewage Treatment Plant (STP) for the discharge of Class SB treated wastewater.

Structural repair of deteriorated concrete and leaks at Primary Settling Tanks, Grit Chamber, Aeration Tanks, Final Clarifier, and Disinfection Tank of Balabag STP was also started in 2019 to strengthen the structures to enable them to withstand strong earthquakes and typhoons.

Boracay Water will also construct a pipe bridge at Napaan and Putol Bridge to replace the cross under pipe damaged by heavy flooding and strong current during Typhoon Urduja. The pipe bridge will provide a stable 24/7 water supply in Boracay Island despite strong typhoons and heavy flooding in the mainland. It is targeted to be completed in 2021.

Boracay Water 2018 - 2022 medium-term action plans:

- Construction of pipe bridge at Napaan Bridge and Putol Bridge to provide a stable structure for pipes crossing the river.

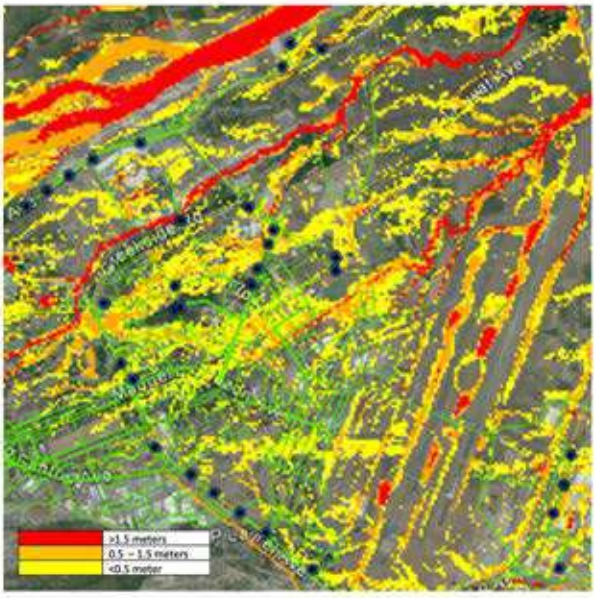
Clark Water

2015 - 2020 ACTION PLANS	STATUS
Vulnerability Assessment of Clark Water facilities to 100-year rainfall	• Completed in 2018
Refurbish/retrofit four Water Supply facilities (reservoir)	• Completed refurbishment of 2 reservoirs • On-going retrofitting of 2 reservoirs

Vulnerability Assessment of Clark Water Facilities to 100-year rainfall

In 2018, Manila Water commissioned an assessment on flood vulnerability with the intent of identifying vulnerable facilities and provide mitigation measures. The assessment utilized flood hazard information from DOST-Project NOAH and interlaced with the Water Supply System of Clark Water. The likelihood of exposure increases from yellow to red as most vulnerable. The exposure assessment map of Clark Water identified several water supply facilities, mostly deep well sources, vulnerable to a 100-year rainfall event. Flood mitigation controls, such as sandbags and raising of controls were incorporated to the existing emergency preparedness and response (EPR) procedures.

Flood Vulnerability Map of Clark Water to a 100-year rainfall event



Clark Water conducted retrofitting activities of tanks to repair damaged portions and strengthen the structures. The company has completed the refurbishment and retrofitting and waterproofing of Lily Tank 1 (2ML capacity) and Tank 3 (2ML capacity) in 2019. Two more tanks, Tank 4 (2ML capacity) and Tank 2 (2ML capacity), are being refurbished and retrofitted in 2020.

Clark Water 2018 - 2022 medium-term action plans:

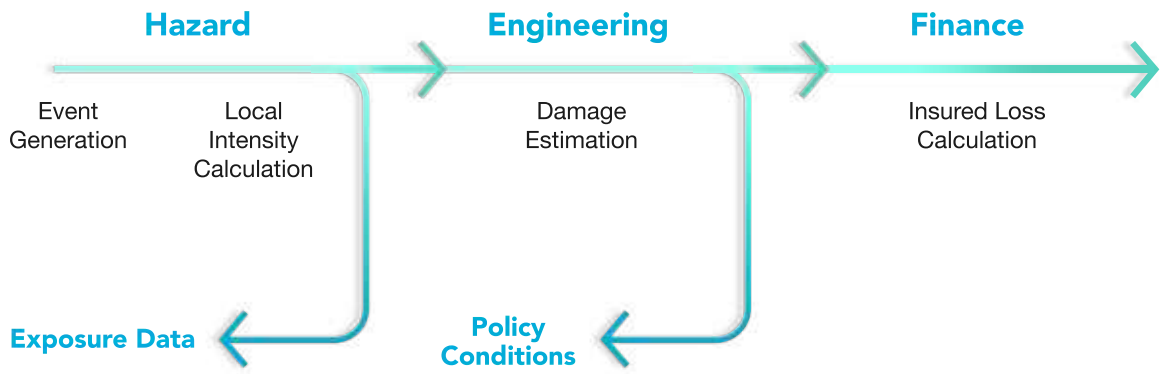
- Refurbish/retrofit four WS facilities (reservoir)

Laguna Water

2015 - 2020 ACTION PLANS	STATUS
Conduct Vulnerability Assessment of Facilities	Completed Resiliency and Business Interruption (RBI) Study of 20 facilities in 2018

Laguna Water conducted the vulnerability assessment of its 20 facilities through a third-party consultant, Howden in 2018. The Resiliency and Business Interruption Study aimed to provide a full risk assessment of Laguna Water's operations based on specific risk events and provide recommendations for ensuring that the impacts of these risk events are properly addressed. The pre-defined scenarios are:

- A 7.2 magnitude earthquake along theWest Valley Fault
- A 180-yr rainfall event
- Tropical cyclone with 220 kph sustained winds
- A volcanic eruption with a maximum exposure up to 100 km radius



The climate-related scenarios of the study are the 180-year rainfall event and the tropical cyclone with 220 kph sustained winds.

The wind loss event will incur a total loss of PhP 237 million with business interruption ranging from 73 days to 340 days per facility. The most susceptible for losses are the support facilities and more particularly, the Laguna Water Warehouse, which stores non-critical spare parts. The Laguna Wellfield has the highest replacement value for a single location.

In terms of the 180-year flood, the total losses are computed at PhP 14 million with business interruption ranging from 0 to 5 days per facility. In an unfortunate scenario that one deepwell will be disconnected due to an operational problem, Laguna Water facility engineers can shift some gate valves to allow continuous water delivery to the service area. This minimizes the potential business interruption to the network.

According to the study, further loss mitigation efforts would not give a significant impact in terms of reducing the potential loss. The study recommended for the strengthening of the disaster response of Laguna Water to minimize the business interruption period. Another recommendation is the replacement of the construction materials used for the Laguna Water Warehouse so that a typhoon would not blow away the external walls and roofing.

The study also performed an Operational Risk Review to provide a qualitative measure of how well risks are managed within individual facilities across Laguna Water, so that effective risk management strategies can be developed and implemented based on sound and comprehensive data.

Laguna Water 2020 - 2025 medium-term action plans:

- Conduct structural assessment to comply with the current structural code (NSCP 2015 7th ed)
- Develop retrofit plans

Enhancing Operational Resilience

Commitments

- Strengthen the disaster risk reduction and management capacity of the organization
- Build and enhance the knowledge, values, and capacities of employees, government, customers, supply chain and other relevant stakeholders on climate change adaptation and DRRM
- Adopt an inclusive and partnership approach with relevant stakeholders in our climate change undertakings

Risks Addressed

Failure to ensure immediate recovery and continuity of business operations through the execution of a comprehensive business continuity management plan in the event of

- Flooding
- Typhoon
- Storm Surge
- Landslides
- El Niño/La Niña

The resiliency of assets and disaster risk reduction and management (DRRM) are interconnected and interrelated in making Manila Water a climate resilient company. Both must be in place and implemented to mitigate the impacts of natural events intensified by climate change. Through DRRM, Manila Water aims to ensure the preparedness of the company, employees, and relevant stakeholders before and during natural events such as flooding, typhoons, landslides, storm surge, El Niño, and La Niña. The company also aims to continue business operations within the set recovery period.

Business Continuity Policy

We, Manila Water Company, Inc. (MWCI), a forerunner in the provision of water, wastewater and other environmental services, commit to the continuity, quick recovery and resumption of our services following any disruption in our operations.

Business Continuity Management and all its supporting units shall strive to achieve prompt recovery of critical services with minimal interruptions, ensuring stability to our customers and stakeholders.

To achieve these objectives, we shall ensure that:

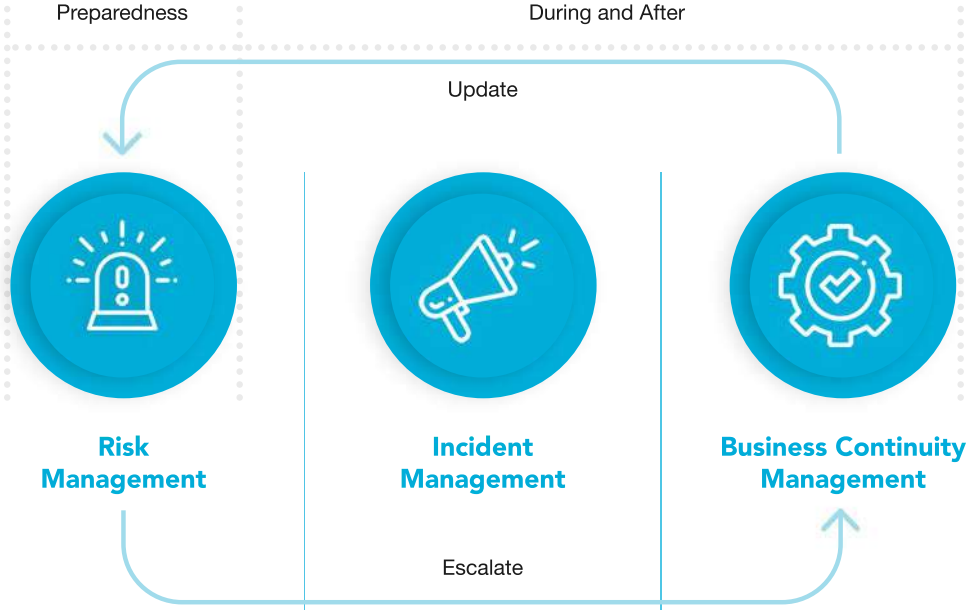
- All our personnel are well-equipped and capable in handling disruptive incidents that can create impact to our service to our customers,
- The necessary resources related to the continuity, quick recovery and resumption are readily available,
- All our machines and equipment necessary to the delivery of its services and products are in good condition and properly maintained to ensure service reliability,
- All Business Continuity procedures are compliant to applicable regulatory and statutory standards.

Furthermore, we commit to the continual improvement of the Business Continuity Management System by keeping abreast with the latest technology and development towards organizational resiliency.

Manila Water has its Business Continuity Framework as the anchor strategy in enhancing its DRRM. The Business Continuity Management Framework outlines the planning process for developing prior arrangements and procedures to enable organization to respond to an event in such a manner that critical business functions can continue within planned levels of disruption. The framework consists of Risk Management, Incident Management and Business Continuity Management. It ensures that policies and procedures are in place before, during and after an incident. Risk Management is the identification of procedures to avoid or minimize impact.

While, Incident Management are set of activities that an organization implements to identify, analyze, and correct hazards in order to prevent a future re-occurrence. On the other hand, Business Continuity Management is the advanced planning and preparation of an organization to maintain business functions or quickly resume after a disaster has occurred. It also involves defining potential risks including fire, flood or other natural calamities, unforeseen events that may have an impact to an organization.

Business Continuity Framework



Goal	Reduce and manage the risk	Response to minimize the impact	• Recover critical operation and processes • Restore and return to normal operations
Escalation Criteria		• Within set recovery period • Impacts are limited and manageable	• Beyond recovery period • Impacts are extensive
Process	• Risk identification and assessment • Risk treatment and action planning	• Impact mitigation • Emergency response	• Impact mitigation/augmentation • Restoration - Normalization

Business Continuity Roadmap

2016 - 2017

BCM Structure

Risk assessment, BRA, ERP, disaster recovery planning, BCM Team Kasannga, NATCAT, workshops, earthquake BCP

Maturity Level 3

2018

Plan Roll-out

Education and awareness, testing and simulation of DR plans, enterprise-wide communications regarding BC plans, supply chain resiliency. Achieve a BC

Maturity Level 4

2019

Embedding BCM Culture

High level of BC planning, strategy formulation and testing competence across the entire business enterprise

2020

Maintaining BCM Programs

External and internal audit to properly document to improve BC plans and programs, automated monitoring of BC programs. Achieve a BC

Maturity Level 5

Manila Water has mapped out its business continuity roadmap from 2016 to 2020 with programs that aims to improve the company's Business Continuity Management Maturity Framework year on year. The Business Continuity Management Maturity Framework is used to measure the maturity of an organization's business continuity management process and provides a layer in the foundation for continuous process improvement. It was developed to answer the following questions for senior management:

- Where are we now?
- Where do we ultimately want to be?
- What steps do we take to get there?

In 2016-2017, Manila Water is at Maturity Level 3 (Cooperative) which means that the company is moderately prepared to respond to threats and risks. Participating business units and departments have instituted a basic governance program, mandating at least limited compliance to standardized Business Continuity Management Policy, practices and processes to which they have commonly agreed.

The company has embarked on education, communication, strategy formulation and simulation in 2018 and 2019 to reach Maturity Level 4 (Standards Compliant). All critical business functions have been identified and business continuity plans for their protection have been developed across the organization. For the first time, all four Business Continuity disciplines have been "fully" implemented.

In 2020, the enterprise aims to be at Maturity Level 5 (Integrated). In this stage, the organization meets all of the requirements of Level 4 that is now integrated throughout the company enterprise adopting continuous quality improvement practices. Business continuity plans and tests incorporate multi-departmental considerations of critical enterprise business processes.

Manila Water provides assistance to its employees and customers during Typhoon Ulysses.

2015 - 2020 Manila Water DRRM Initiatives

Capacity Building/Emergency Preparedness and Response Groups

Manila Water has established a group of personnel intended to support business continuity operations of the company. These are the 503rd (Manila Water) Water Service Batallion and Sagip Buhay. The 503rd Batallion is one of the affiliated reserve batallions of the Armed Forces of the Philippines, which is organic to the AFP Reserve Command Affiliate Reserve Group of the AFP Reserve Command. It is a Combat Service Support & Service unit specializing in water treatment, water distribution, and sewage management with subspecialties in urban search and rescue, disaster relief and rehabilitation, civil-military operations and co-operations. The primary duty of the 503rd Batallion is to secure the water facilities. It is also part of the corporate responsibility arm of Manila Water.

On the other hand, Sagip Buhay is a group of employees trained to respond to basic first aid procedures during emergencies. Both groups underwent rigorous trainings and upskilling. Among the said groups' involvement are Mass Blood Donation (in partnership with Red Cross), tree planting, and other civic military operations. Existing members of Sagip Buhay and 503rd Batallion will undergo refresher courses and retraining. The groups will also recruit more employees to become members of the group.

The MWPV Business units have also created their fire brigade, fire volunteers, organization search and rescue group, first aider to respond to emergencies in their companies. These groups were equipped with the necessary capacity building and trainings such as Basic First Aid and Life Support and Flood Incident Response Safety Training, Emergency Response, and Mobile Treatment Plant Operation and Maintenance.

Emergency Preparedness and Response Procedures and Drills

Each Business Unit has its facility-specific emergency preparedness and response (EPR) procedures on different emergencies such as flooding and typhoons, fire, earthquake, and chemical spills. Regular drills are performed in each facility to simulate a specific emergency response and check employees' preparedness, operability of emergency equipment, and availability of resources. The emergency preparedness procedures are updated as needed, and recommendations are made to improve the EPR on the drills' evaluation.

Prior to pandemic, Manila Water activates the call tree when there is a PAGASA Public Storm Signal No. 2 and above, PAGASA Orange or Red rainfall alert, and Earthquake Intensity 6 or higher. Employees are required to respond to the call tree within 30 minutes to determine the situation and whereabouts of all personnel during this time and the need to respond to them.

During the 2020 pandemic, Manila Water developed a call tree app for the daily reporting of whereabouts, health status, and situation during the quarantine period. The app is also linked to Safe Re-entry App (SARA), an app that contains workers' health status.

Business Continuity Equipment

Manila Water has invested in business continuity equipment necessary for contingency and EPR, such as generator sets, mobile treatment plants, water tankers, and static tanks. Manila Water aims to minimize water service disruptions and provide potable water to customers and stakeholder even during natural events.

Manila Water has six Mobile Treatment Plants (MTPs) that can treat and convert any type of raw water – river water, flood water, salt water – into potable drinking water. These MTPs are used during emergencies during calamities to provide potable water to customers and even outside the service coverage areas.

The MTP produces about 3,000 liters of drinking water per hour and can operate optimally up to 12 hours a day. MTPs were deployed in different areas in the Philippines to respond to the potable water needs during and after calamities. Some of the deployments are in Bohol (7.2 magnitude earthquake, 2013), Bantayan, Cebu (Typhoon Yolanda, 2013), Districts of Albay (Mt. Mayon volcanic eruption, 2018), Davao del Sur (6.9 magnitude earthquake, 2019), and in the province of Batangas (Taal Volcano eruption, 2020). Through its CSR arm, Manila Water Foundation, the company also provided potable water to calamity-stricken areas.

Other available water supply emergency equipment are water tankers of varying sizes at 10 m^3, 5 m^3 and 3 m^3 and static tanks with capacities of 2 m^3, 10 m^3, and 15 m^3. In-line emergency reservoirs were constructed in eight evacuation centers in Metro Manila.

These are used to supply potable water to water interruption areas and evacuation centers during emergencies and calamities.

Standby generator sets are in-place in facilities to provide power supply in case of power outage. Thirty-eight (38) mobile generator sets are also available for deployment to facilities in need of generator sets.

EPR equipment such as speedboat, folding boat, floating docks, an amphibious vehicle, life vests are in-place in Manila Concession. Go bags are provided for all MWO employees. MWPV business units are in the process of procuring necessary EPR equipment.

Mobile treatment plants are deployed to provide potable water in calamity-stricken areas.

Business Continuity Centers

Aside from equipment, Manila Water ensures that its employees will have a contingency or back up workplace/work station in times of business interruptions. The company has built Work Hubs, Logistics Hubs, Operation Monitoring, Control Center/Incident Prevention and Response Center, and Business Continuity Operation Center. The facilities are on standby if not in use. During the 2020 pandemic, the company used the San Juan hub consecutively as remote workforce and rapid testing facilities. As for the Operation Monitoring and Control Center, its main functions are the following:

- Designed point of contact for normal situation, emergency response, all field communications, and 24-hour notifications
- Responsible for the central dispatch, triage, and communication functions for day to day operations and emergencies, interacting with Customer Service Center as needed
- Documents incident information, analyzes data, and prepares report

Another project on the pipeline is the Business Continuity Operation Center. To date, Manila Concession has completed installation and setup of CCTVs and access controls at satellite facilities. Moving forward, vision will be:

- Connectivity of CCTVs to the IPRC
- Integration of technology applications – GIS Maps, Web-based hazard apps
- Response protocols and procedures
- Registration of employee biometrics for the access control

Laguna Water has satellite offices in Cabuyao and Biñan, Laguna. These satellite offices are used during the Taal volcanic eruption and pandemic in 2020. Clark Water has established its Simulated Disaster Recovery Site at Lily Hill in March 2020 before the quarantine. Boracay Water has identified a location for its back up workplace in case of business interruptions.

Supply Chain Resiliency

Manila Water needs to ensure an adequate supply of critical materials during natural calamities; thus, it has a service level agreement with its chlorine and fuel suppliers.

Partnerships

Manila Water partners with relevant agencies on DRRM. Manila Water is an active member of the Philippine Disaster Resilience Foundation (PDRF) (formerly known as Philippine Disaster Reconstruction Foundation) since its inception in 2009. PDRF was established as a response to the call of the government to have the private sectors' support in the reconstruction initiatives after the devastation brought by Typhoon Ondoy in Metro Manila.

Manila Water has partnerships with National Disaster Risk Reduction Management, Metropolitan Manila Development Authority, Bureau of Fire of the Philippines, and Philippine National Red Cross for various DRRM initiatives.

El Niño/La Niña Contingency Plans

Given the challenges that Manila Water has experienced in the past, the company has implemented measures to provide Metro Manila East Zone customers with 24 hours of water availability with at least 7psi. These include supply augmentation, improved system readiness, and demand management.

With the continuous support of MWSS, LGUs, and other government agencies, Manila Water will implement mitigating measures for the current supply deficit and prepare for the different water supply scenarios for 2020-2021.

Supply Augmentation

- Operation of Cardona Water Treatment Plant (WTP) at 100 MLD
- Operation of deepwells to provide 100 MLD
  - Reactivation of existing deepwells at 50 MLD
  - New deepwells at 50 MLD
- Backwash water recovery from WTPs at 30 MLD
- Supply augmentation alternatives (Marikina River Portable TP at 20 MLD)

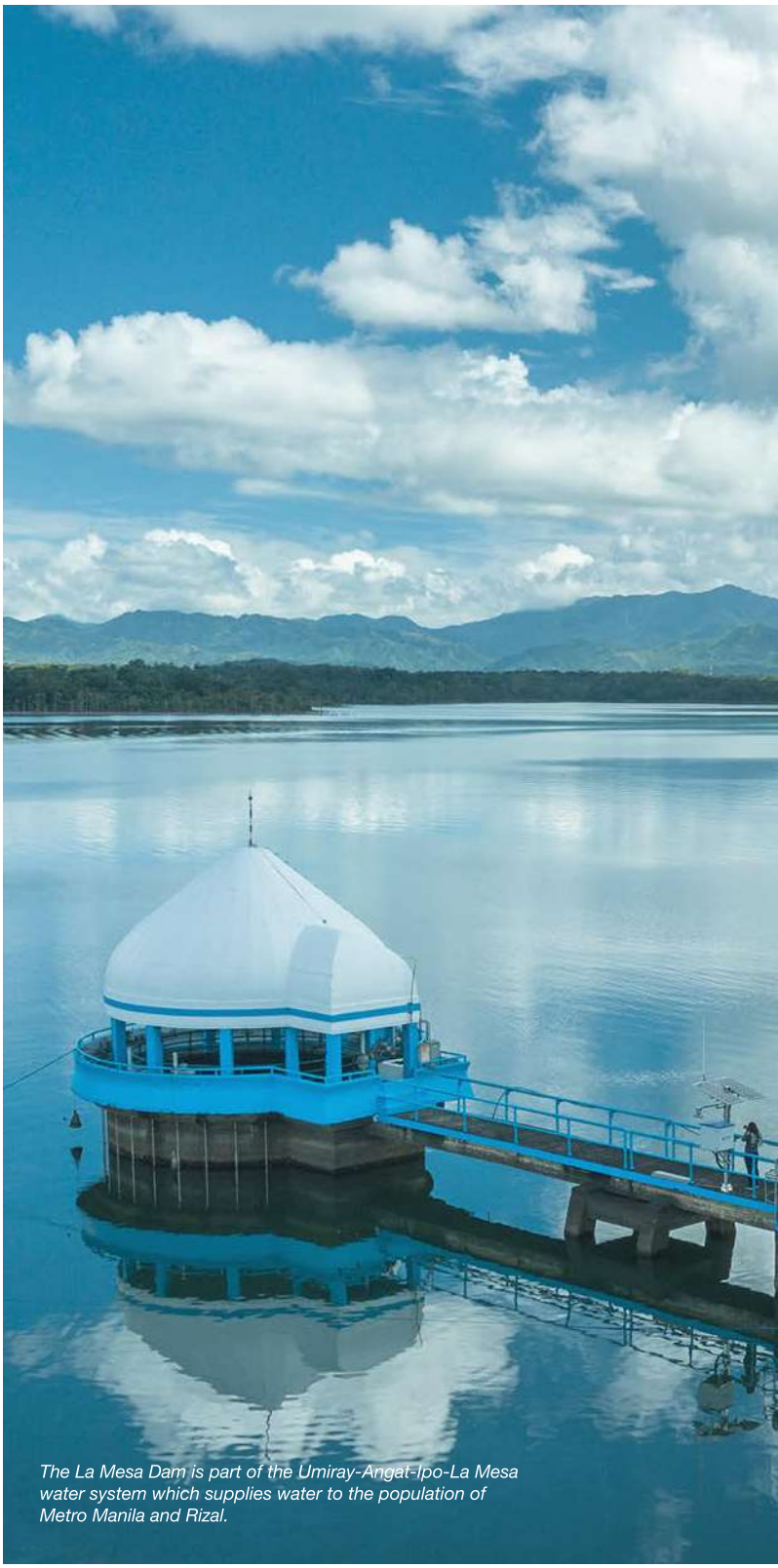
Improve System Readiness

- Operation of Luzon WTP at 20 MLD
- Rain catchers - Alat Reservoir
- Commissioning of line boosters in 60 locations
- Acceleration of augmentation and express lines in various locations

Demand Management

- Rotational water interruption (in coordination with NWRB & MWSS)
- Non-Revenue Water Management Program (maintain at <12%)
- Pressure Management Program (installation of additional 285 pressure reducing valves (PRV) and 180 PRV Automated Controllers)
- Responsible Use of Water Campaign in partnership with Metropolitan Waterworks and Sewerage System, Metropolitan Manila Development Authority, National Water Resources Board, and Department of Interior and Local Government and other agencies

Manila Water will continue to strengthen its DRRM to effectively respond to emergencies and calamities and reduce business interruption time.



The La Mesa Dam is part of the Umiray-Angat-Ipo-La Mesa water system which supplies water to the population of Metro Manila and Rizal.

Reducing Carbon

Commitment

Continue to undertake climate change mitigation programs

Risks Addressed

Increase of greenhouse gases from the use of fuel and electricity; methane generation from septic tanks of customers and solid wastes

Opportunities Addressed

- Use of energy and resource-efficient technologies and practices that will reduce costs and provide other intangible benefits
- Use of Renewable Energy to reduce GHG emissions
- Expansion of wastewater and sanitation services
- Protection and rehabilitation of watersheds

The Philippines accounts for 0.35% of the global greenhouse gas emissions (Worldometer, 2020). Although it is minimal, the Philippines has included in its conditional Nationally Determined Contributions to the Paris Agreement to reduce greenhouse gas emissions of about 70% by 2030 relative to its business as usual scenario of 2000-2030. The reduction of CO_2e emissions will come from energy, transport, waste, forestry, and industry sectors.

Manila Water supports this target through its climate change mitigation programs, including implementing energy efficiency initiatives, using renewable energy, and expanding wastewater coverage to avoid methane generation from septic tanks. The company also undertakes tree planting to protect and enhance watersheds and help in carbon sequestration.

The Climate Change Mitigation Committee conducted a benchmarking session in 2018, participated in by key managers from Manila Concession and MWPV business units. It aimed to be a venue to share best practices and advanced technologies. The benchmarking session highlighted the many energy efficiency initiatives and renewable energy projects in the water supply and wastewater facilities across the Manila Concession, Clark Water and Laguna Water.

Manila Concession

2015 - 2020 ACTION PLANS	STATUS
Energy Management System of 10 facilities (5 water supply and 5 wastewater facilities)	• Certified until 2019; • Re-aligned to the requirements of RA 11285 for Manila Water
Strengthen energy efficiency program	• Implemented several energy efficiency programs
Explore the use of renewable energy in facilities	• Conducted feasibility studies on different renewable energy technologies • Installed solar panels in three (3) facilities with a total of 222.5 kilowatt peak (kWp)
Expand sewer coverage	• Increased sewer coverage from 13% in 2015 to 31.48% in 2020

Energy Efficiency Projects

The Manila Concession is the first Philippine company to be certified on ISO 5001 Energy Management System (EnMS) for its ten operating facilities in 2014. The certification was maintained until 2017. The company is currently expanding the Energy Management System to other facilities, making everyone in the ground aware of their energy consumption behavior while gathering data needed for benchmarking purposes. Moving forward, the company is to take parallel steps to comply with RA 11285 or the Energy Efficiency and Conservation Act passed in 2019, which is all in line with the country's commitment to the UN SDG's on Climate Action.

The Manila Concession has implemented several energy efficiency projects to reduce electricity and fuel consumption in its operations. Some of the significant energy efficiency initiatives undertaken from 2015 to 2020 are the following:

Water Supply

- Maximization of the use of gravity lines in the distribution system
- Optimization of processes and equipment
- Demand-based Network Management
- System load balancing
- Pump efficiency testing and refurbishment
- Installation and optimization of variable frequency drives
- Maintaining NRW at optimum levels
- Project Lights Out (automation of pump stations)

Wastewater

- Change of lobe-type blower to more efficient screw and turbo blowers
- Optimization of processes and equipment

General

- Conversion to LED lighting
- Replacement of air conditioners to inverter-type
- Preventive maintenance of equipment
- Clean fleet initiatives (use of energy efficient vehicles, preventive maintenance of vehicles and eco-driving trainings)

Manila Concession GHG Emission compared to the GHG Avoidance due to Wastewater Treatment

	2015	2016	2017	2018	2019
GHG Emission, tons CO_2 (eq)	83,082.00	85,041.00	81,743.25	90,362.45	94,592.74
GHG Avoidance *, tons CO_2 (eq)	44,934	39,461	40,428	36,252	37,228
% GHG Avoidance	54%	46%	49%	40%	39%

* Computation of GHG avoidance was based on the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories on Wastewater

Manila Concession GHG Intensity

	2016	2017	2018	2019
GHG Intensity of Water Supply (tons CO_2 (eq)/ MCM billed volume	144	135	149	160 *
GHG Intensity of Wastewater (tons CO_2 (eq)/MCM wastewater treated	174	164	137	263 **

* Increase in GHG intensity of Water Supply in 2019 due to the operation of Cardona Treatment Plant, which is more energy-intensive than a conventional water treatment plant, and the intake facilities of Cardona requires four pumps to pump water from an elevation of 10 to 120. Manila Concession also installed booster pumps in several locations to increase pressure during the low water supply in 2019.

** GHG Intensity of Wastewater in 2019 increased due to still low utilization rate of the newly completed Marikina North STP.

Employees energy efficiency efforts are recognized through the 'Biggest Loser: Trimming the Energy Bulge' competition from 2013 to 2018 and Innovations Award from 2014 to 2019. Through its continuing energy efficiency initiatives, Manila Water has consistently received recognition from the Department of Energy's Don Emilio Abello Energy Efficiency Awards and Asean Award on Energy Management in Buildings and Industry (Small and Medium Industry Category) in 2018.

Manila Water commits to utilizing renewable energy whenever financially feasible. Manila Concession installed solar panels in two wastewater facilities and one water supply facility with a total of 222.5 kWp capacity. The company further conducts feasibility studies for the use of solar panels in other facilities.

Manila Water piloted a waste-to-energy plant with septage sludge as its feed at the FTI Septage Treatment Plant.

The company also conducted a feasibility study and detailed design of a 1.2 MW mini-hydro plant in Balara, Quezon City, but it was not implemented due to operational considerations.

To further increase the company's use of renewable energy, Manila Water will procure 20% of its Open Access electricity from renewable energy starting in July 2021. This is equivalent to 16% of the total electricity consumption of the Manila Concession.

The 1.1 million trees planted in the watersheds offset carbon emissions. However, the company has not yet conducted a detailed carbon sequestration accounting. Based on rough estimates using carbon sequestration of 236 tons of CO_2 per ha in a natural forest and 88 tons of CO_2 per ha in an agroforestry, there is about 420,000 tons CO_2/year sequestered from the trees planted in the watersheds of Manila Concession.

Estimated Carbon Sequestered through Reforestation

WATERSHED	HECTARES PLANTED	TYPE OF FOREST	CARBON SEQUESTRATION PER HA BASED ON TYPE OF FOREST*, TONS CO2/HA	CARBON SEQUESTERED, TONS CO2/YEAR
Ipo	736	Natural Forest	236	171,893
La Mesa	735	Natural Forest	236	183,394
Upper Marikina	757	Agroforestry	88	66,613
Total				421,901

**Source: Camacho, et.al, Carbon Sequestration Benefits of the Makiling Forest Reserve, Philippines. 2009.*

The total organic pollution removed in wastewater treatment in 2019 translates to 79,085 tons of carbon dioxide equivalent of avoided methane formation, using the latest updated factors generated by the Intergovernmental Panel on Climate Change. This carbon avoidance is 39% of the carbon emissions of Manila Concession operations.

Manila Water installed solar panels in FTI Septage Treatment Plant, Marikina North Sewage Treatment Plant and Delos Santos Pumping Station that have a total capacity of 222.5 kWp.

2021- 2025 Manila Concession Targets:

- By 2022, 16% of electricity of Manila Concession will be sourced from renewable energy
- Identify and implement possible energy efficiency measures coming from the records generated from EnMS adaptation
- Continue the Pump Efficiency Program
- Review and re-visit the solar masterplan
- Increase sewer coverage to 65% by 2026

Manila Water Philippine Ventures

2015 - 2020 ACTION PLANS	STATUS
Conduct energy audits and implement energy efficiency initiatives	Implemented energy efficiency projects such as operations improvement , NRW reduction, conversion to more efficient technologies
Explore the use of solar energy	Installed solar lights/panels in some facilities
Provide desludging services in Laguna; Expand sewer coverage in Boracay	Started desludging services in Laguna in 2018, Sewer coverage expansion to 61% in Boracay water

MWPV implements energy efficiency projects in all its business units. The project includes network pipe re-sizing, equipment upgrades, automation, treatment process optimization, and other operational improvements to contribute to energy efficiency. The business units have ventured into non-revenue reduction (NRW) program to reduce resource consumption, including water, energy, and chemicals.

MWPV is in the process of aligning to the requirements of RA 11285 or the Energy Efficiency and Conservation Act passed in 2019. Clark Water has a certified Quality, Environment, Health and Safety Management Systems.

Boracay Water

Boracay Water GHG Emission compared to the GHG Avoidance due to Wastewater Treatment

	2015	2016	2017	2018	2019
GHG Emission	1,639	2,640	3,532	2,844	3,013
GHG Avoidance due to Wastewater, tons CO_2 (eq)	3,727	4,145	4,778	2,802	3,200
% GHG Avoidance	227%	157%	135%	99%	106%

Boracay Water GHG Intensity

	2016	2017	2018	2019
GHG Intensity of Water Supply (tons CO_2 (eq)/ MCM billed volume	349	363	384	338[A]
GHG Intensity of Wastewater (tons CO_2 (eq)/MCM wastewater treated	431	560	596	656[B]

[A] Decrease in GHG intensity of water supply due to an increase in billed volume and improvement of NRW (down to 9.8%)
[B] Increase in GHG intensity of wastewater due to use of gensets instead of electricity during rehabilitation of Boracay Island.

Boracay Water has converted its lighting from fluorescent lamps to LED lamps in its facilities. The company also installed solar perimeter lights in its facilities in 2018 and aims to continuously implement energy efficiency programs to further reduce its energy consumption and GHG emissions. Boracay Water implemented operations improvement such as the installation of VFD and automation of Bantud Pumping Station.

Boracay Water has sewer coverage at 61% based on the available sewer network and conducts desludging services in areas where sewer lines are not availabe. Thus, it provides more carbon avoidance than its operations' carbon emission as shown in the table.

Boracay Water conducted coral rehabilitation/planting at Bulabog outfall under its Coral REEFhabilitation project, one of the environmental program components of the Highland to Ocean (H2O) program. In partnership with the Department of Environment and Natural Resources (DENR) through CENRO, Boracay Business Association of Scuba Diving, and the LGU of Malay, Boracay Water will be adopting a snorkeling area for the protection and monitoring of corals. Another component of the H2O program is the Nabaoy watershed protection and tree planting. To date, Boracay Water has planted a total of 65,332 trees at the watershed, which helps in carbon sequestration. The CENRO's Multi Forest Protection Committee is preparing a resolution to adopt the H2O program of Boracay as one of its environmental umbrella programs within the Municipality of Malay.

2021 - 2025 Boracay Water Action Plans:

- Conduct energy audits to identify areas for energy efficiency improvements.
- Strengthen the partnership within stakeholders and communities through IEC.
- Develop five-year program to ensure the protection and rehabilitation of the watershed in Nabaoy
- Sustain higher GHG avoidance than GHG emissions of operations

Cebu Water

Cebu Water GHG Emission and Intensity

	2015	2016	2017	2018	2019
GHG Emission, tons CO_2 (eq)	134	78	74	96	48
GHG Intensity of Water Supply (tons CO_2 (eq)/ MCM billed volume		366	389	335	265

There was high GHG Intensity in years 2016 and 2017 due to use of gensets during power outages brought about by typhoons in Cebu. Cebu Water uses variable frequency drives in pumps to make its water operations more efficient and reduce energy consumption.

2021 - 2015 Cebu Water Action Plans:

- Development of Energy Management System (EnMS) in accordance with RA11285
- Explore installation of solar panels at Liloan Pumping Station
- Supply and installation of VFDs for pumps and deepwells

Clark Water

Clark Water GHG Emission compared to the GHG Avoidance due to Wastewater Treatment

	2015	2016	2017	2018	2019
GHG Emission, tons CO_2 (eq)	7,350	7,634	8,360	9,382	9,855
GHG Avoidance due to Wastewater, tons CO_2 (eq)	2,699	1,361	5,366	4,910	5,002
% GHG Avoidance	37%	18%	64%	52%	51%

Clark Water GHG Intensity

	2016	2017	2018	2019
GHG Intensity of Water Supply (tons CO_2 (eq)/ MCM billed volume	520	529	606	622
GHG Intensity of Wastewater (tons CO_2 (eq)/MCM wastewater treated	88	79	92	99

Clark Water has implemented optimization of processes that include Just in Time operation, use of old storage tanks to minimize power consumption due to direct pumping, rehabilitation of wells to reduce the need of new water sources, and retrofitting of existing facilities to more energy-efficient designs. Clark Water has replaced all its lamps with LED. It has also installed solar panels with 23 kWp in its facilities. In 2020, Clark Water decreases the carbon emission through carpooling and work from home arrangements.

2021 - 2025 Clark Water Action Plans:

- Invest in additional renewable power for large facilities
- Retrofit existing systems to more energy-efficient designs
- Replace aging fleet and upgrade to fuel-efficient models

Laguna Water

Laguna Water GHG Emission compared to the GHG Avoidance due to Wastewater Treatment

	2015	2016	2017	2018	2019
GHG Emission, tons CO_2 (eq)	10,408	14,955	19,470	16,008	15,603
GHG Avoidance due to Wastewater, tons CO_2 (eq)	1,111	1,005	1,220	1,445	1,626
% GHG Avoidance	11%	7%	6%	9%	10%

Laguna Water GHG Intensity

	2016	2017	2018	2019
GHG Intensity of Water Supply (tons CO_2 (eq)/MCM billed volume	319	375	355	331
GHG Intensity of Wastewater (tons CO_2 (eq)/MCM wastewater treated	280	364	289	286

Laguna Water implemented several energy efficiency initiatives through operations improvement in water supply and wastewater facilities.

Water Supply

- Replacement of old pump by new eco-booster pumps
- Increased capacity of deep wells to reduce running hour of other deep wells
- Dedicated line for deep wells going to the settling tank to utilize full deep well capacity
- Replacement of defective/ inefficient pump & motor
- Pipe resizing
- Implementation of SCADA for booster stations & deep well facilities
- NRW reduction program

Wastewater

- SCADA upgrade,
- Replacement of inefficient pumps/systems,
- Backyard composting to reduce solid waste volume

General

- Converted lamps to LED and air conditioners to inverter-type

Laguna Water installed solar panels in Booster 3 that has a capacity of 213 kWh/ day. The company is installing a solar-powered lighting post per facility. Several trainings were conducted for its operators to assess the status of assets and prevent equipment breakdown and ensure the efficiency of operations. Trainings include Predictive Monitoring and Condition Monitoring Training, Electrical Motors Training, and FBAS Operation Training.

2021- 2025 Laguna Water Action Plans:

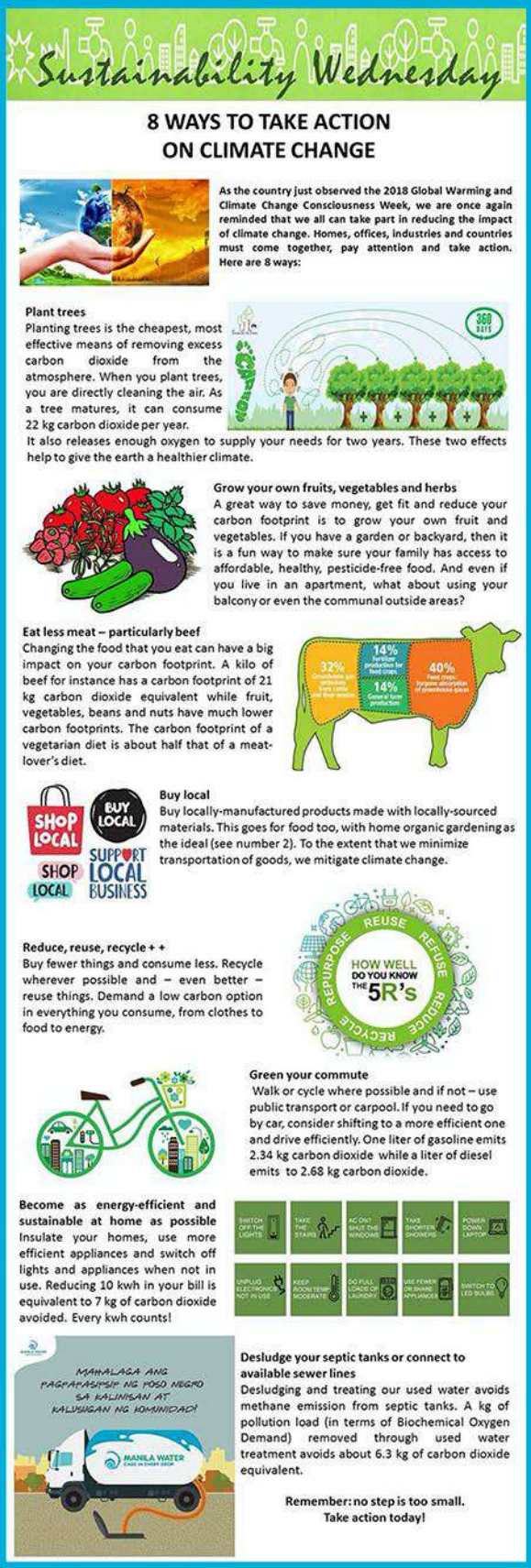
- Continue with the implementation of energy efficiency projects, process optimization and upgrade
- Explore renewable energy such as waste-to-energy technology, and hydro energy from wastewater flow
- Install of additional solar lights and solar panels when feasible

Nurturing Partnerships

Through the years, Manila Water regularly conducts climate change awareness and capacity building to its different stakeholders. Sustainability Bulletins and Audio-Visual Presentations are released during the Climate Change Week every 3rd week of November to strengthen the awareness of employees and provide simple doable climate actions that can be done personally in every day activities. Energy efficiency-related seminars and activities are also conducted every Energy Week every December.

Photo: Manila Water employees educate elementary students on environmental stewardship through puppet show, story-telling and games.

Sustainability Bulletins



Manila Water regularly comes out with sustainability bulletins and some are related to climate action.

One of Toka Toka activities with partners is creek clean-up.

Manila Water conducted Sustainability Summits, Environmental Forums, and Workshops for the Supply Chain that talks about Climate Change, Disaster Risk Reduction and Management; Business Continuity, Resource Efficiency and Cleaner Production Energy Efficiency and Resiliency, among others. Sharing of best practices on energy efficiency and resiliency among identified critical vendors were also conducted. Manila Water communicates its Climate Actions during forums and seminars of external stakeholders.

Customers and other stakeholders are educated on environmental protection through Manila Water's Lakbayan Water Trail and Bawat Patak, Tumatak Goes to School.

Lakbayan aims to provide an opportunity for members of the public to experience the water trail and foster an in-depth understanding of the value of water conservation and managing water after it is used. Lakbayan takes visitors to a water source, a water treatment plants and finally a wastewater treatment plant. As of 2020, 123,671 participants were able to participate in Lakbayan since 2006.

Bawat Patak, Tumatak Goes to School is a sub-program of the Bawat Patak Tumatatak ("every drop makes a mark") employee engagement program, which gives volunteer employees an opportunity to communicate the importance of proper environmental practices such as water conservation, proper solid waste management, sanitation and wastewater management to elementary school students.

Activities involve story reading; puppet shows and games which incorporate messages on personal responsibility and environmental sustainability. Since 2015, the program has partnered with 36 elementary schools, reached 3,658 grade school students and tapped the assistance of 398 Manila Water volunteer employees.

Manila Water also ramped up its wastewater and sanitation campaign through discussions on these topics during Kasangga Days and kick-off of desludging activities in barangays.

In 2012, Manila Water initiated its Toka Toka Movement, an advocacy program that aims to inform and educate people on the need for wastewater management in communities, the value of personal commitment and the collective impact of individual actions for the environment such as having septic tanks desludged, connecting houses to sewer lines where available, segregating solid waste and spreading the gospel of environmental sustainability among one's family and friends. This multi-stakeholder effort banks on the strategy of cooperative volunteerism from program partners such as local government units, national government agencies, businesses, media, the academe and the non-profit sector. As of 2020, the Manila Concession has partnered with a total of 34 government and non-government organizations to sustain the campaign.

Boracay Water developed its own local version of Toka Toka in 2016, which is called Amot Amot Para Sa Malimpyong Boracay. The campaign advocates proper management of wastewater and solid wastes in every household and establishments as their share (Amot) in sustaining the pristine waters and beaches of Boracay Island. It also focuses on education awareness and cleanup activities around the island in partnership with the LGU, barangays and the Boracay Foundation, Incorporated.

Laguna Water launched its TSEK ng Bayan (Tamang Sanitasyon Equals Kalusugan, Kalinisan, at Kaunlaran ng Bayan) in 2017. TSEK ng Bayan is an advocacy campaign that educates people about sanitation, particularly on the need for proper wastewater treatment. Laguna Water brings the campaign to different barangays, municipalities, and cities in Laguna to encourage communities to practice desludging of septic tanks at least every five years or to connect to a sewer network.

Toka toka exhibits provide awareness to different stakeholders on the need for proper solid wastes and wastewater management.

Manila Water started its Luntiang Lingap in 2015, an urban gardening program for barangays and schools to provide food security even during calamities.

This program is in partnership with the Bureau of Plant Industry of the Department of Agriculture. The participating barangays and schools were provided with trainings, technical assistance, seeds, and gardening materials. To date, the program engaged a total of 14 barangays and two schools in urban gardening. Several urban gardening seminars were also conducted for the employees of Manila Water.

MANILA WATER
CARE IN EVERY DROP

Moving Forward

Climate change — in combination with other megatrends such as technological innovations, environmental degradation, economic globalization, and demographic and societal shifts -- will certainly be a force that helps drive the 'new normal'. However, water and wastewater services will always remain a basic need of communities and individuals. For those communities to be climate-resilient, Manila Water will also need to be resilient. The company continues to work at mitigating and enhancing its climate-driven risks and opportunities, respectively, to ensure continued value protection and creation.

To magnify the impacts of its climate change policy, Manila Water intends to replicate its best practices on its newly operational subsidiaries, and introduce key performance indicators for all business units in alignment with the objective to define short and medium term enterprise-level sustainability targets.

In early 2021, Manila Water has signed up as a supporter of the Task Force for Climate Related Financial Disclosures, with the target of adopting the eleven TCFD recommendations for the reporting year 2022. This adds to the growing set of sustainability reporting frameworks that the company has adopted, such as those of the Global Reporting Initiative, International Integrated Reporting Council and Sustainability Accounting Standards Board. Alignment with the Science Based Targets Initiative principles, once finalized, are also being looked at for better articulation of the sustainability targets of the company.

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