GWOPA
Global Water Operators' Partnerships Alliance
UN-HABITAT FOR A BETTER URBAN FUTURE
Moving towards
The 4th Global WOPs Congress

#UtilityClimateAction
Webinar Report

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
On behalf of
Federal Ministry for Economic Cooperation and Development

GWOPA Webinar Series: #UtilityClimateAction Session

In 2020, GWOPA/UN-Habitat and BMZ/GIZ launched a webinar series focusing on how Utilities Fight COVID-19. The webinar series continues into 2021 showcasing best practices and lessons learned on utility climate action, circular development, and wastewater management.

Cities and communities worldwide are increasingly suffering the effects of climate-related disasters, such as floods, droughts, sea level rise, heatwaves, landslides, and violent storms. Yet many water and sanitation utilities are not sufficiently prepared to handle these risks. Infrastructure currently designed under historical climate conditions is more vulnerable to future weather extremes and climate change.

The first topic of the 2021 webinar series was #UtilityClimateAction and took place in two volumes (9 and 16 June) with over 160 participants. The presentations showcased **water and sanitation utilities facing climate hazards especially flood, drought, heat and wildfire**. The GWOPA webinars aim to provide a platform to make the experiences and the concrete needs of utilities heard and seen, and to facilitate global exchange by bringing operators of different regions together to **share best practices that strengthen peer operators' knowledge and skills**.

This report first presents key take aways and recommendations on technical/financial, peer learning/collaboration and governance/administration aspects followed by experiences and useful lessons from eight utilities from across the world, in preparing and implementing emergency response plans as well as responding to extreme weather events and their impacts on water supply, water and wastewater infrastructure, and utility personnel. We hope it will provide you with inspiration in how to tackle the challenges that lay ahead for us all.

"The decisions we make within our water utilities will have implications that last not just for decades but they will shape development for centuries. We should be thinking about that long-term perspective, and when we do, we have to think of a climate change perspective"

John Matthews
Executive Director, Alliance for Global Water Adaptation (AGWA)

"We started thinking about our watersheds as critical infrastructure, not only the physical infrastructure"

Laurna Kaatz
Climate Program Director, Denver Water

TECHNICAL AND FINANCIAL ASPECTS

Infrastructure

Bayawan Water District
DOWASCO
Lahore Water
WUCA

- New investment and construction of essential infrastructure to account for previously unseen and less predictable climate conditions and climate hazards
- Insure infrastructure, aiding with recovery of utilities following extreme weather events
- Acknowledgement of watersheds as critical infrastructure that require robust adaptation preparedness and emergency response planning to ensure their protection

Strengthening emergency preparedness plans

AGWA
DOWASCO
EMASESA
North East Water
SWSC

- Development of systematic plans as a contingency for long-term climate adaptation preparedness. These plans will help to minimise damage and ensure effective response and service continuity
- Plans need to be robust, developed with several scenarios and contingencies in mind, and reviewed for updates periodically. They should seek to thoroughly prepare for events that may not have been common in the past, e.g. extended periods of drought in a region known for ample rainfall
- WOPs can share their own emergency preparedness plans and methodology with other operators to help other partners in the development of their plans

Recovery

Aguas Cordobesas
Bayawan Water District
DOWASCO
North East Water

- Emergency preparedness plans should include a Recovery Phase of planning. It is important that operators can take concrete steps, guided by robust emergency planning, continuity plans, and multi-stakeholder approaches to minimize service disruption, restore full service and repair infrastructure as quickly as possible
- Water operators can cooperate with regional and national institutions to facilitate planning development. This will help guide operators through multi-stakeholder approaches to minimize service disruption, restore full service and repair infrastructure as quickly as possible

Climate Finance

Bayawan Water District
SWSC

- Investments and capital investments that go into water management need to consider sustainability and climate resilience. Utilities have begun preparing ‘climate proof’ project proposals for resource mobilisation
- When polled, webinar participants stated that finance is the most important source of support needed by utilities to prepare for future climate risks

PEER LEARNING AND COLLABORATION

Knowledge sharing

Bayawan Water District
North East Water
WUCA

- Peer-to-peer learning between operators is key to generating new insights and sharing solutions for replication
- Global networks are important for learning at an international scale, while regional and local knowledge sharing is also crucial for utilities' daily work

Regional support mechanisms and cooperation

DOWASCO
WUCA

- Regional and local mechanisms can support the pooling of resources in small geographic areas that need immediate solidarity and assistance following a natural disaster
- Regional networks ensure rapid response and aid, while other actors mobilise to the area

Cross-sectoral collaboration

AEAS
Aguas Cordobesas
Denver Water
SWSC

- Climate change adaptation measure can have additional benefits for related sectors and stakeholders, such as agriculture, forestry, and even local indigenous communities

GOVERNANCE AND ADMINISTRATION

Monitoring

Aguas Cordobesas
Denver Water
EMASESA
SWSC

- Water and sanitation operators should develop and maintain sufficient monitoring capacity. Monitoring networks not only aid with daily operations management but are key in effective emergency response
- Operators can also develop partnerships and cooperations with other institutions who may be able to assist with building monitoring capacity

Digitalization of water

AEAS
EMASESA

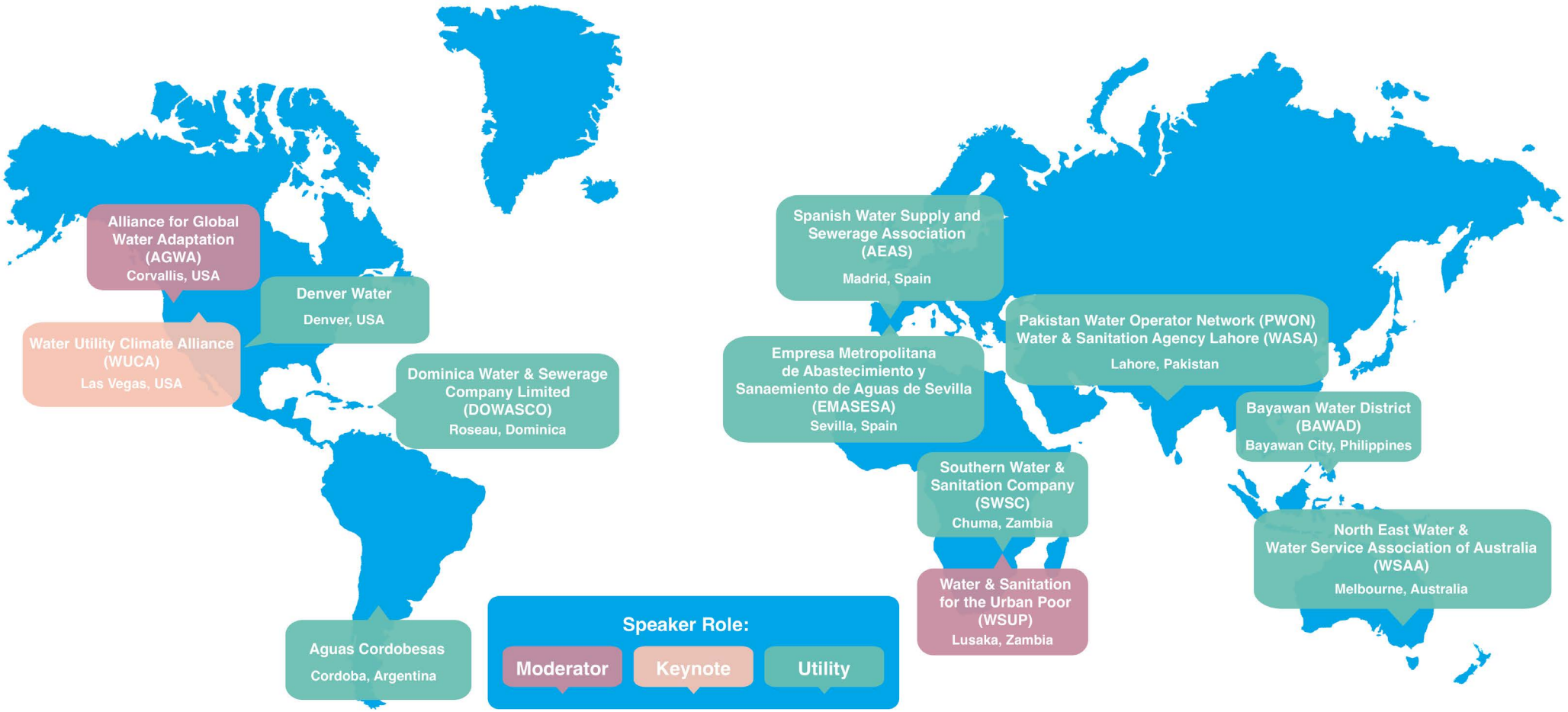
- Adopting digitalisation across utility operations can help greatly in reacting quickly and effectively to climatic hazards and emergencies
- It can also help to reduce end user consumption in times of water shortages and droughts by enabling better monitoring of usage rates and encouraging cutbacks where possible, improving the resilience of water utilities

Governance for climate adaptation

AEAS
AGWA
EMASESA
Lahore Water
North East Water
SWSC

- Decision making processes need to be streamlined and remain transparent for all relevant stakeholders
- Extreme heat or wildfire can often act as catalyst events, prompting water and sanitation utilities to shift their practices to include climate adaptation as part of their general operations

The #UtilityClimateAction Global Panel of Speakers



Special thanks to the GWOPA regional platforms and partners for their support in the realization of the webinars:

Listen to the presentation by Syed Zahid Aziz, WASA Managing Director, Lahore, **Pakistan**, here

FLOOD

About PWON and WASA

PWON: National Utilities Association
WASA: Local utility (member of PWON)
20M people in the service area
35% living in informal settlements
90% coverage ratio for water
80% coverage ratio for sanitation
Approx. 2.5M connections
Approx. 25,000 employess

Impact on service provision, infrastructure and staff

Staff and utilities' reputation among the citizens is negatively affected by the floods in the city.

WASA LAHORE

Climate context

In Pakistan, climate change has been particularly challenging in terms of the regional reliance on ground water. Typically, ~3 months of the year the monsoon season (July to September) brings about 600mm of precipitation – but now there have been abrupt storms that will bring around 250-300mm of rainfall within just a single day. This brings flash floods, especially in urban areas.

Adaptation measures taken and lessons learned

- The water infiltration rate in the Lahore region is not high, so this sudden onslaught of water often causes catastrophic flooding. To solve for the issues of both water storage and flooding, the utility constructed underground water reservoirs to help collect this water when there is a sudden influx in supply, putting it to use. A tennis court was constructed on top of this reservoir, meaning there was little to no compromise on the recreational area land use for the citizens of Lahore. This led to reduced water accumulation on the nearby road. This model was then replicated in three other areas in the city.

- To recycle the water used for ablution in the nearly 200 Mosques throughout the city, WASA-L constructed small water reservoirs to capture and reuse this water for irrigation of parks and playgrounds.

- Reduce air pollution: Every Saturday, WASA staff, including the general manager cycle to work.

- As groundwater depletion is another effect of climate change, WASA-L is shifting their main water supply from groundwater over to surface water sources.

Listen to the presentation by Alma Abrasaldo, General Manager of Bayawan Water District, Philippines and Carl Kamstra, Project Manager WaterWorX project "Performance Enhancement Water Utilities in the **Philippines** (PEWUP) here

FLOOD

About Bayawan WD

Local utility
148,000 people in the service area
31.5% coverage ratio for water
31.5% coverage ratio for sanitation
8,940 connections

Climate context

In October 2020, Bayawan was hit by typhoon Quinta, which brought significant rainfall and subsequent flooding in the region.

Impact on service provision, infrastructure and staff

This flooding destroyed the water district's newly built water treatment facility, including the destruction of the facility's electrical infrastructure. The treatment facility has served 263 households (1,447 people) since 2019, which were suddenly cut off from the piped water supply after the flooding. While BAWAD has a water tanker available for mobile response, poor and sometimes steep road conditions meant the tanker couldn't reach affected households. Instead, as had been done in the past, residents had to get their water from untreated sources or purchase expensive water from private suppliers.

Adaptation measures taken and lessons learned

- The flooding event was exceptional and unexpected. When the original facility was constructed, it seemed impossible that the water level of the river could suddenly rise by 8 meters. The Bayawan Water District was later able to acquire funding and rebuild the facility at a higher level, with the electrical equipment also placed at an elevated position.

- Future infrastructure will be designed with even the most extreme weather situations in mind. Although the response to the destruction of the facility was swift and effective, an emergency response plan is crucial to future operations and is currently being drafted.

WATER BAYAWAN DISTRICT BAWAD

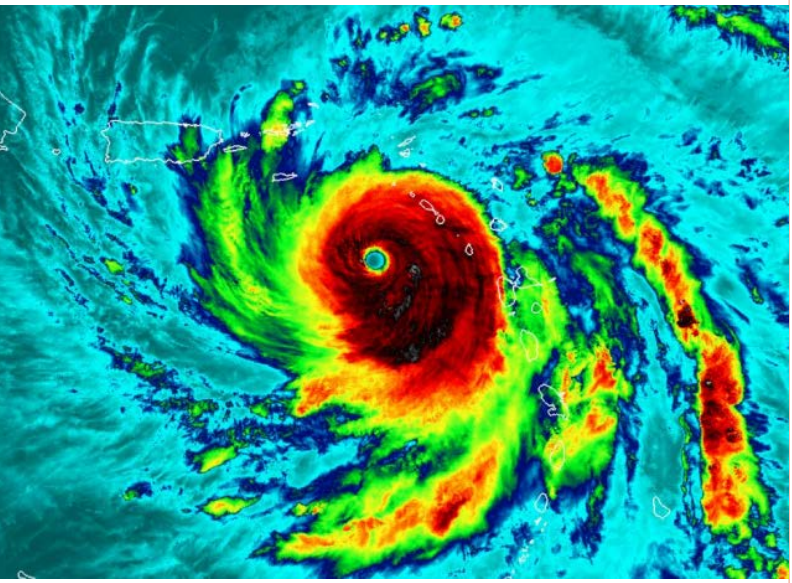
Listen to the presentation by Bernard Ettinoffe, General Manager of Dominica Water and Sewerage Company Limited (DOWASCO), **Dominica** here

About DOWASCO

National utility (wholly owned government company and the sole water and sewerage utility)
Approx. 70,000 people in the service area
95% coverage ratio for water
15% coverage ratio for sanitation
23,821 connections
6.7 staff per 1,000 water connections

Impact on service provision, infrastructure and staff

The reduced surface water flow is significant for DOWASCO, as these rivers source much of the island's drinking water. Storms in the region are becoming more unpredictable and the most severe of them devastate the island periodically in terms of loss of lives, essential service disruption and infrastructure damage. Hurricane Maria disrupted most systems in several ways and blocked access routes through landslides or mudslides. Siltation also became a serious problem during the disasters, as sedimentation levels in rivers made water treatment even more challenging for the utility. Furthermore, most utility personnel lost their homes during Hurricane Maria, but showed up to work nevertheless to ensure essential services could recover as quickly as possible.



Source: National Hurricane Center via K&M Advisors

Climate context

Dominica is a tropical island nation in the Caribbean–known as the land of many rivers (~360 rivers)–and DOWASCO supplies water to almost the entire island (~98%). Dominica has significant rainfall, with approx. 1,800mm annual precipitation on the west coast and approx. 5,000mm on the east coast and central island. However, there has been a measurable decline in rainfall over the past decades, which has affected surface water flow. The latest measurements of rapid streams show flows of 6 million gallons per day, versus average past measurements of 10 million gallons per day. The region has also been seriously impacted by tropical storms and hurricanes in recent years, e.g. Tropical Storm Erica in 2015 and Hurricane Maria (Category 5) in 2017.

Adaptation measures taken and lessons learned

- These experiences have led to more robust emergency planning in the case of extreme weather events. Examples of adopted measures include:
  - » Compact, mobile filtration equipment that can be
  - » positioned directly at rivers and streams to provide end users with quick and immediate potable water.
  - » Alternative water sources, e.g. plastic water storage tanks (800-5,000 gallons) that can be deployed in case of a natural disaster.
  - » Continuity plans that also prioritise the welfare of utility personnel. This means that staff wellbeing is accounted for even in an emergency situation, which in turn serves the public' needs in terms of having reliable access to drinkable water. A dedicated Staff Welfare Committee assists in the drafting and review of these plans regularly.

- As Dominica suffers from drought as well, they raise people's awareness on how to reduce their water consumption when necessary.

- DOWASCO maintains partnerships with regional forestry management, as well as the environmental health and agriculture sectors to curb pollution and ensure the health of riparian areas.

- Peer-to-peer support & solidarity from regional utilities, facilitated through CAWASA (the Caribbean Water & Sewerage Association), helped a great deal in recovery efforts following extreme weather events.

Dominica Water and Sewerage Company Limited

Listen to the presentation by Gift Monde, Managing Director Southern Water and Sanitation Company Limited, **Zambia** here

DROUGHT

About SWSC

Local utility, Souther Province of Zambia
516,588 people in the service area
66% living in informal settlements
95% coverage ratio for water
86% coverage ratio for sanitation
60,716 connections
441 employess

Impact on service provision, infrastructure and staff

This situation negatively impacted SWSC's operations by resulting in reduced water sales and subsequently reduced revenues. Most rural areas had no water for livestock that year and many animals died.

Climate context

The utility is based in southern Zambia where precipitation has dropped sharply since the 1980s. The Southern Province lies in a region that has continued to experience a downward trend in precipitation for many years. In 2019, the situation became dire, as urban water sources began to reach critical levels, with 7 out of 12 dams drying up completely and low river levels affecting abstraction points.

Adaptation measures taken and lessons learned

- With the significant drop in supply, SWSC had to shift the paradigm of how they manage their operations as far as climate variability is concerned. The utility now operates with a climate resilience mindset in that it has embedded 'climate proofing' measures into of all new infrastructure development projects. Deep wells have been drilled as part of the solution to drying water sources. To adapt to an uncertain climate future and update their climate resilience campaign, SWSC has partnered with various stakeholders to support the utility in a number of interventions. These stakeholders notably include local government, OpenNet 40 Zambia and Water and Sanitation for the Urban Poor (WSUP). Some of the adaptation activities that have been undertaken include:

» Signing of MoU on Infrastructure Development
» Coordination with different Local Authorities, which gives SWSC power to take part in infrastructure development supervision especially the LICs Toilets and onsite sanitation in general. This has been the point of weakness in groundwater contamination
» Formation of Water Safety Plan Teams with multi stake-holders
» Tree planting around water sources and formation of Catchment Protection Committees
» Development of Emergency Preparedness Plan
» Preparation of Climate Proof Project Proposal for Resource Mobilisation
» Installation of solar powered boreholes

Listen to the presentation by Lucas Perea, Head of Cooperation and Finance of Empresa de Abastecimiento y Saneamiento de Aguas de Sevilla S.A. (EMASESA), **Spain** here

About EMASESA

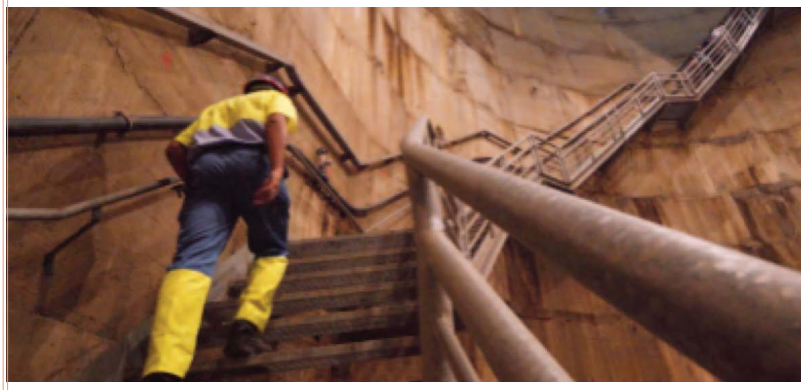
Metropolitan water operator
>1.3M people in the service area
Less than 0.5% living in informal settlements
100% coverage ratio for water
100% coverage ratio for sanitation
>380,000 costumers
815 employess

Climate context

EMASESA is located in southern Spain with a Mediterranean climate, where in the next 25 years the average temperature could rise by as much as 5°C, while precipitation is also on the decline.

Impact on service provision, infrastructure and staff

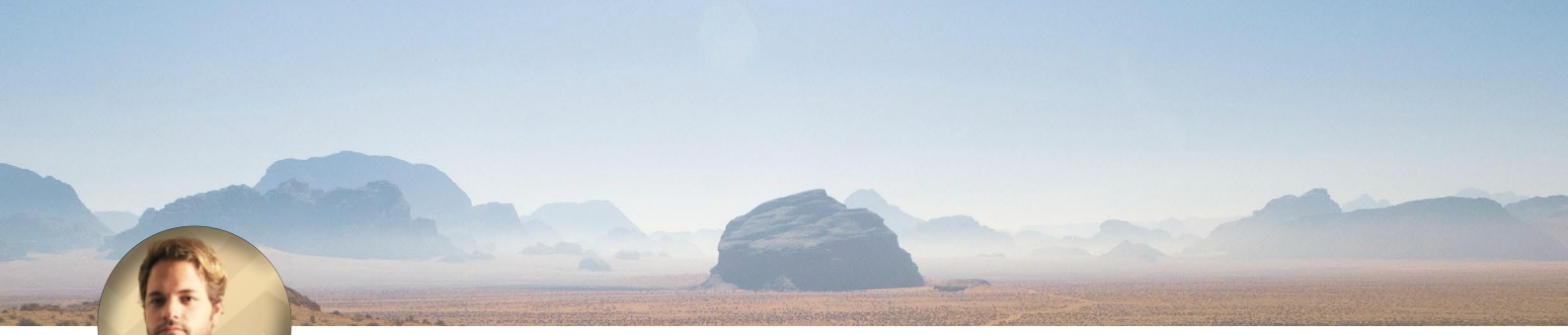
Water resources could decrease by up to 65 %, while periods of rainfall have become shorter and shorter with extended drought cycles. In 2019, Seville declared the climate emergency and thus EMASESA saw it as an obligation to create a plan to adapt the utility to climate change.



Adaptation measures taken and lessons learned

- EMASESA worked towards integrating sustainability into every aspect of the utility. They have created an extensive, 50-measure climate emergency plan (in Spanish, download here) to adapt the utility for greater sustainability and climate resilience, including but not limited to:

  » 36% reduction of water consumption, per person per household
  » Reducing the amount of water that is wasted in infrastructure system, incl. capturing more rainfall water / creating storm water reservoirs which helps to store water, but also helps to prevent overwhelming storm water drainage
  » More robust monitoring of water quality in water reservoir systems
  » Linking water with energy production and reducing energy used by water pumps and water treatment plants
  » Adopting more participative processes, e.g., creation of a water observatory with a diverse range of stakeholders



Listen to the presentation by Andrés Guerra Librero Castilla, Technical Manager of Asociación Española de Abastecimientos de Agua y Saneamiento (AEAS), **Spain** here. Access his presentation here.

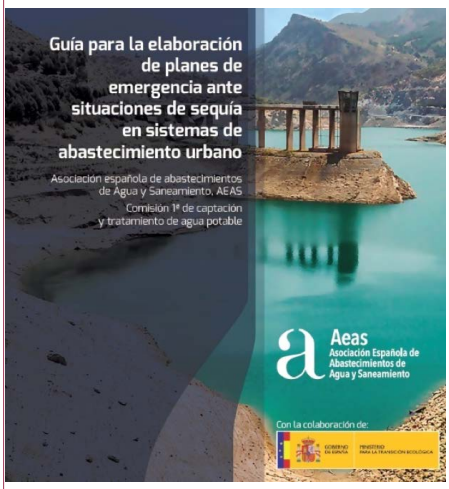
Climate context

A government report commissioned by Spain's Ministry of Agriculture and Fisheries, Food and the Environment found that climate change will have tangible effects on the nation's water supply, and is projected to (see graphics in presentation here):

- Reduce precipitation by as much as 24%
- Increase average temperatures by up to 5.6°C
- Decrease aquifer recharge by as much as 40%
- Decrease total run-off by as much as 43%

Impact on service provision, infrastructure and staff

AEAS is comprised of over 4,000 operators at the municipal level, many of whom are also affected by global trends of climate change including drought, floods and temperature increase. Droughts and increases in heat have presented the challenge of aggravated water scarcity, meaning utilities must always be mindful of their supply levels so they are able to provide reliable service.



Adaptation measures taken and lessons learned

- In light of this and other mounting data, efforts have been made to plan around and have tools in place for the different impacts of climate change, to adapt and maintain resilient systems. In the case of water, this has especially centered around scarcity planning (i.e. climate resilient water supply planning for the future).

- To help with planning around ever more unpredictable and extreme weather and drought events, AEAS has written publications such as the Guide for the preparation of emergency plans for drought situations in urban water supply systems as well as the National storm tank design recommendations manual (both in Spanish).

- Cities have also begun to advise to citizens on how to deal with heatwaves and how to save water. It is crucial to engage end users and inform them of water scarcity and how to use water wisely in order to preserve the resource for everyone.

Aeas
Asociación Española de Abastecimientos de Agua y Saneamiento

Listen to the presentation by Enzo Bonfanti, Production Manager of Aguas Cordobesas S.A., **Argentina** here

WILDFIRE

About Aguas Cordobesas S.A.

Local water operator
1,649,751 people in the service area
1% living in informal settlements
99% coverage ratio for water
100% coverage ratio for sanitation
391,496 costumers
458 employess

Climate context

Córdoba is a semi-arid region with an annual rainfall of approx. 700 mm, falling mostly between late spring and summer. The dry season is between April-September and in 2020 there was only 27 mm of rainfall. Aguas Cordobesas has two water treatment plants that are supplied by two lakes, Los Molinos and San Roque. Between Lake San Roque and the treatment facility that is supplied by it, there were destructive fires. When there is significant rainfall in this area the mountains direct water down, dragging soils, and if there are ashes they run into the river from which Aguas Cordobesas has its intake.

Impact on service provision, infrastructure and staff

When ash enters the water treatment facility it is very difficult to coagulate it, so it cannot be treated and the process has to be interrupted. Once the rain ends and the ashes stop flowing in, then service can be restarted. In 2008 and 2017, the utility's treatment plant was interrupted, as heavy rainfall following wildfires flushed the ashes into rivers and lakes. Both regional temperature increases (reducing water mixing) and the influx of ash following the fire event (high phosphorus content) have led to an overpopulation of algae and phytoplankton in lakes.

Adaptation measures taken and lessons learned

- This prompted the utility to work closer with government partners as the National Water Institute, the National University of Cordoba, and firefighters among others, to better understand weather patterns improving prediction of precipitation levels and what to do once it starts to rain with flooding intensity. In such a case, response now often includes personnel arriving onsite and taking samples of water concentrations and based on results, implementing certain crisis measures. They sample all nearby rivers and then decide whether to close intake gates or not.

- For the utility, quick and accurate monitoring followed by result-based decision making has become crucial in ensuring minimal operational downtime and damage to infrastructure.

AGUAS CORDOBESAS

Listen to the presentation by Laurna Kaatz, Climate Scientist with Denver Water, **USA** here

WILDFIRE

Climate context

Colorado is in the inner-mountain west of the US, and Denver is a high-elevation city, with 80% of the utility's water supply origins from snowpack melt that feeds various reservoirs. The region has a history of sporadic and intense periods of drought and wildfire that are natural for the region, but now aggravated and intensified by climate change.

Impact on service provision, infrastructure and staff

In 2002, Denver experienced simultaneous disasters with severe single-year drought (due to historically low snowpack) and one of the worst wildfires the state had ever experienced happening in the watershed of a crucial supply reservoir. As a result, the reservoir was filled with sedimentation, ash and debris–leaving the water untreatable, as the utility's facilities were not prepared to treat these types of contaminants.

Adaptation measures taken and lessons learned

- With the use of tree rings, past droughts could be identified dating back to 1634. With results of these analyses, future predictions and scenario analyses help the utility to prepare for future natural hazards, which might be even intensified due to climate change.

- Denver Water is setting its new focus on simultaneous natural disasters, rather than only wildfire or only drought. Beside other forestry management programs, this includes water management, pre- and post-fire planning as well as further collaboration with local stakeholders.

- Ultimately, they have shifted to seeing watersheds as critical infrastructure and have found a direct link between the protection of watersheds with the prevention of fire damage.

DENVER WATER

Listen to the presentation by Dan Deere of Water Futures for Water Services Association of Australia & John Day, Executive Manager Operations of North East Water, Victoria **Australia** here
Access their presentation here

WILDFIRE

About WUCA

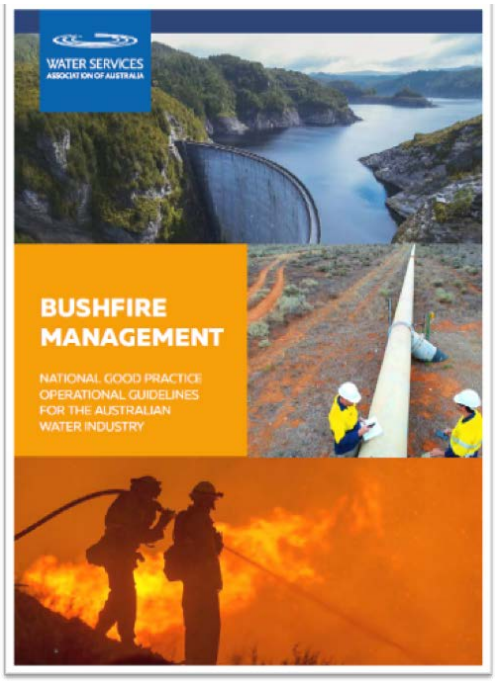
North East Water location: Inland
150,000 customers
Around 20% of people in the service areas living in informal settlements
57,000 connections
190 employess

Climate context

Relative to the rest of the country, North South Wales comprises only a small part of the nation's area. However, this state captures most of the country's water–meaning that any wildfires that burn there can have serious implications for the region's water supply.

Impact on service provision, infrastructure and staff

In 2019-2020, wildfire tore through over 12 million hectares of land, leaving vast areas of drinking water catchments in New South Wales and Victoria heavily impacted. This was made worse by record-breaking temperatures and severe droughts. North East Water noted impact on fatigue of the utility staff as the fire seasons are getting longer and more intense. One of the communities served by North East Waters lost 50% of its dwellings through the bushfire.



Adaptation measures taken and lessons learned

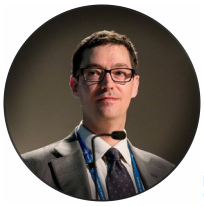
- The wildfires prompted WSAA to develop the national good practice operational guidelines for wildfire management (download here) for the Australian water industry. The guidance makes use of current knowledge and experience in the industry to provide practical recommendations across the water sector on bushfire and water quality management.

- North East Water developed 6 climate resilient principals based around community integration, affordability, good option alternatives. This has helped to create an actionable, year-long climate action plan, which is revised annually. Measures for these plans include steps like keeping emergency having a robust digital network, keeping response vehicles fully stocked with repair equipment and ready to go at a moment's notice, having mobile generators that are constantly serviced, keeping solar and battery backups for treatment plants on hand, among others.

- One of their biggest lessons is that we must learn to live with change and run with the shifts that adaptation will bring because they also bring resilience. Necessity has brought innovation and flexibility for thinking beyond what we currently experience to push the boundaries of preparedness.

WATER SERVICES ASSOCIATION OF AUSTRALIA

North East Water

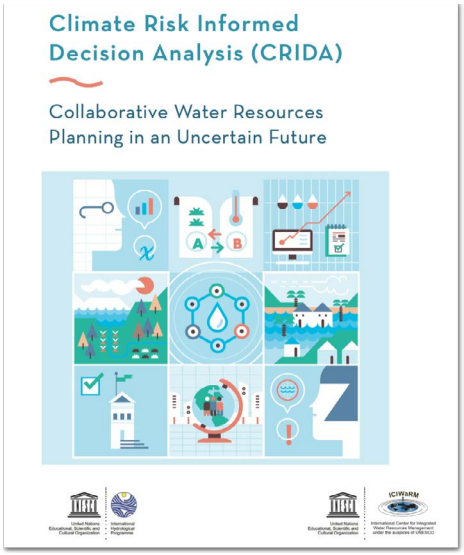


Listen to the keynote by John Matthews, Executive Director of Alliance for Global Water Adaptation (AGWA) here. Access his presentation here

KEYNOTE: RESILIENT UTILITIES, RESILIENT WATER

Progressing forward with a bottom-up approach

Over the past 15 years there has been a significant change from a top-down water management towards a bottom-up approach, involving users and stakeholders in the decision-making process. In many countries right now technical analysts like engineers are beginning to engage quite early in the process with stakeholders to develop a shared vision and set of objectives. This lets stakeholders articulate the problem and their needs, and to have the analyst translate that into the technical language of water management. In practical terms, this means **developing a range of solutions as opposed to a single solution**. This range of solutions can then be evaluated and compared based on their appropriateness for how the climate is changing and transitioning in a region. These bottom-up approaches are still relatively new, and the World Bank published a practical user guide titled The Decision Tree Framework (download here); UNESCO also published Climate Risk Informed Decision Analysis - CRIDA (download here, in Spanish here) as a complementary bottom-up approach in 2018.



Lessons learned from around the globe

Lukasa, Zambia

- This was one of the first test cases for CRIDA approach led by Millennium Challenge Corporation.
- Risk analysis showed limiting factor: insufficient, irregular, diminishing energy for water treatment—not water supply.
- Developed a diverse, modular, distributed, low-cost alternative electrical supply system.

Udon Thani, Thailand

- Udon Thani is a major trade hub between China and Thailand, along the Mekong River.
- Their approach was to look at the water utility itself while also looking at other parallel sectors to embed the utility into other issues such as energy production (hydropower) and agriculture (irrigation needs), as well as increases in both drought and flood intensity.
- They have also developed urban wetlands and lakes (so called sponge city) are installed and lead locally to more resilience across sectors against floods and droughts.

California, USA

- The state has also recently adopted the CRIDA approach led by the Department of Water Resources combining resilience for flood and droughts.
- The region is prone to cyclical, long-term droughts as well as sudden flash flooding and runoff.
- There is now a voluntary system to capture flood water and manage aquifer recharge.
- Historical reliance on snowpack melt providing surface water supply–now moving towards a more reliable liquid water storage below ground.

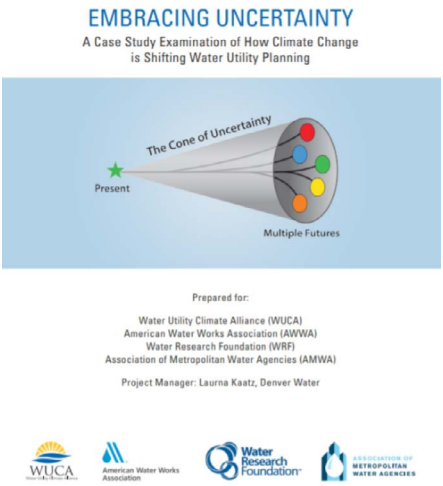
AGWA

Listen to the keynote by Laurna Kaatz, former Chair of WUCA here. Access her presentation here

KEYNOTE: CLIMATE CHANGE ADAPTATION IN PRACTICE

Engineering as a key piece to the adaptation puzzle

Currently, it is crucial to collaboratively advance water utility climate change adaptation. In cooperation with other partners, WUCA developed engineering-focused case studies to show water sector climate adaptation in practice–beyond just the planning; to demonstrate how engineers and water managers are applying climate change data to design infrastructure; to enable engineers in the water sector to learn from peers; and to inspire new approaches to engineering projects among WUCA members and the broader utility realm (see for example Embracing Uncertainty here).



Lessons learned from across the USA

Tarrant Regional Water District, Texas

- In 2011, record drought and multiple high heat days over 100°F, and 90°F lake water, led to failure of some drinking water cooling pumping systems.
- TRWD redesigned the cooling systems using a closed-loop glycol system and an "air-cooled" not "lake-cooled" heat exchange process.
- The redesign means the pump station equipment will be more resilient to higher temperatures, drought and extreme heat in the future.

Southern Nevada Water Authority, Nevada

- SNWA constructed a Low Lake Level Pumping Station (L3PS), designed to pump from lower depths.
- Lake Mead water levels continue to decline during the worst drought in recorded history in the Colorado River Basin.
- Climate change information was used to help determine the probable range of future lake elevation changes and the likelihood of Lake Mead water levels dropping below existing pumping capabilities.

Colorado Department of Natural Resources, Colorado

- The Colorado Dam Safety Program decided to use the best available science to update Probable Maximum Precipitation (PMP) estimates and rules and regulations for dams in CO.
- A Colorado–New Mexico Regional Extreme Precipitation study examined the potential impacts of climate change on extreme rainfall.
- Based on this scientific study, Dam Safety officials decided to increase PMP estimates by a 7% Atmospheric Moisture Factor which will now be used in flood modeling studies used to inform dam designs in the state.

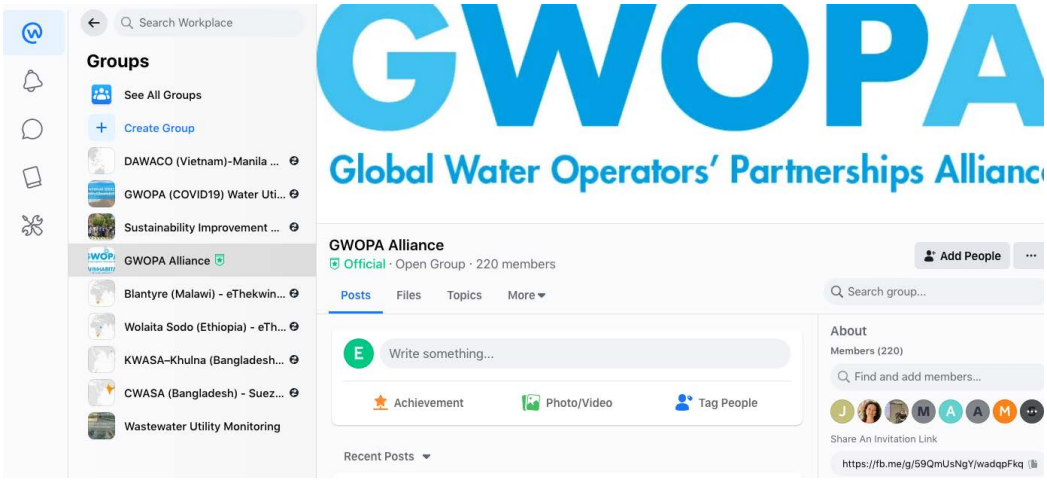
A discussion to be continued

in the GWOPA Community of Practice

GWOPA aspires to operate as an effective global alliance on Water Operators Partnerships (WOPs) and by creating an online GWOPA Community space, strives to enhance itself as a strong and fruitful water solidarity network.

We invite you to join our **GWOPA Community of Practitioners on Workplace** where you can connect to peers working in the water sector, network, share experiences and best practices, discuss problems and jointly brainstorm on possible solutions. You will also find resources shared in this webinar series, meet many webinar panellists and participants and learn answers to the questions that were left unanswered. Soon, the Community will feature active moderation by experts committed to accelerating creation of key thematic hubs at the utility-sustainability nexus. The membership in the Community is free of charge.

If you are interested in joining, please use this link and take an active role in supporting water operators across the globe in improving their performance and ensuring access to all.



and at the 4th Global WOPs Congress

The **4th Global WOPs Congress** serves as an accelerator and flagship event for the global WOPs movement as the GWOPA network and new partners come together around a shared commitment to helping each other. The Congress will accelerate the scaling up of effective peer-to-peer partnerships between water operators worldwide.

Follow GWOPA on social media and **subscribe** to the newsletter to stay updated!

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The 4th Global WOPs Congress

18 — 29 October 2021

GWOPA
Global Water Operators Partnership Alliance

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