

A YEAR OF EXTREMES:
LESSONS LEARNED

W-SMART

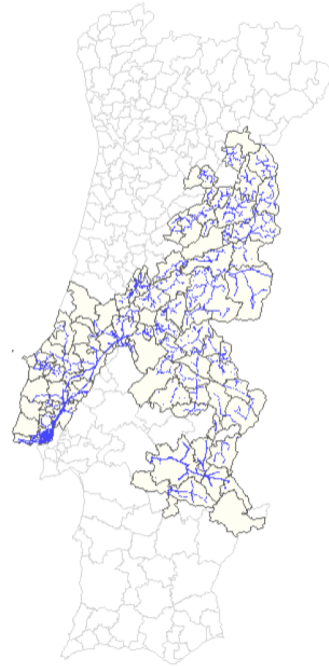
● ALEXANDRA
CRISTÓVÃO

AMWA
Executive Management
Conference

2018
San Francisco, 16 October

A YEAR OF EXTREMES
– LESSONS LEARNED

Agenda



EPAL is a public sector company. It's the oldest **(150 years)**, and largest, water supplier in Portugal.

EPAL manages water treatment, transport and supply and wastewater collection and treatment.

87 municipalities
(including
Lisbon)

3,8M inhabitants

12,550 sq mi

2.200 infrastructures/ sites

1.000 employees

50 WTP

396 WWTP

234 WPS

293 WWPS



Águas Livres Aqueduct








Mother of Water Museum

- **Capital:** Lisbon
- **Population:** 10,32 M
- **Area:** 36 621 sq mi
- **GDP:** US\$ 217,571 M

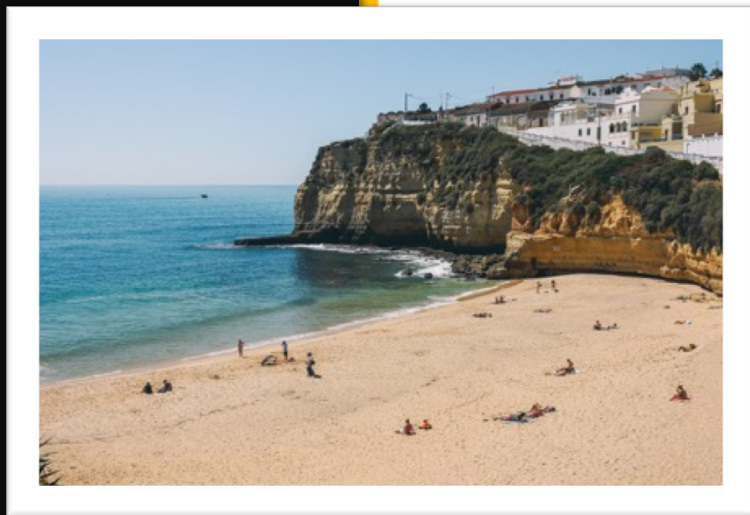
2017



 Portugal				United States 	
Comptes nationaux - Government					
Annual GDP [+]	2017	217,571M.\$		19,485,400M.\$	2017 Annual GDP [+]
GDP per capita [+]	2017	21,142\$		59,792\$	2017 GDP per capita [+]
Labour					
Average Wage [+]	2017	20,327\$		52,988\$	2017 Average Wage [+]



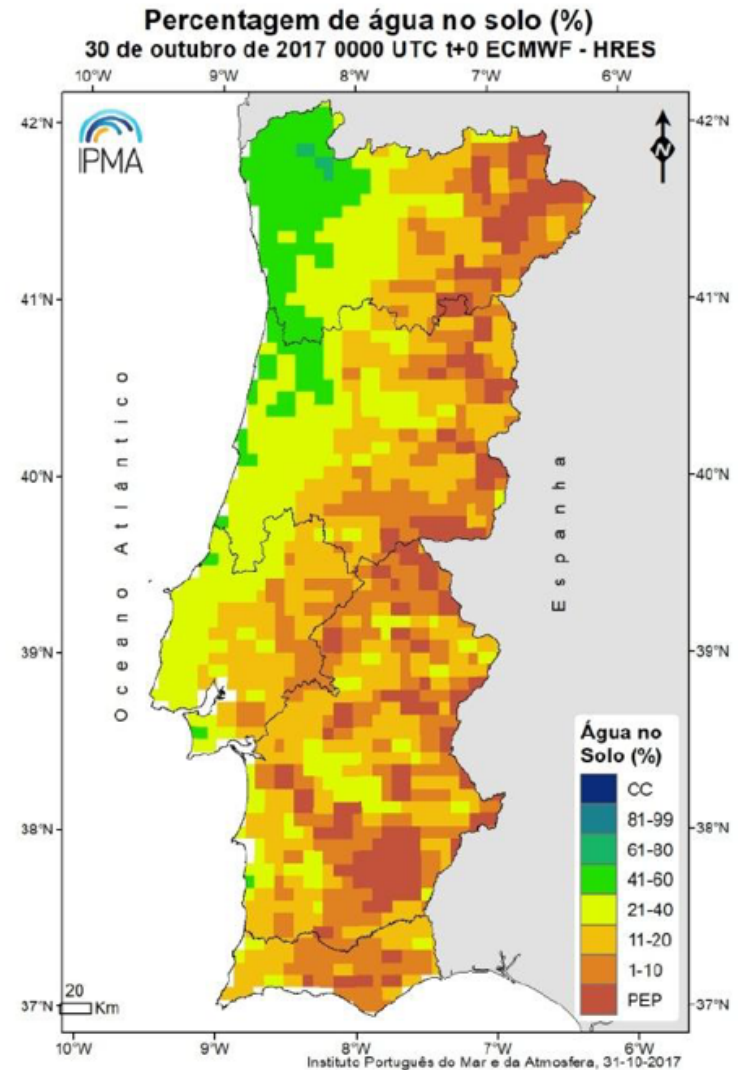
PORTUGAL



PORTUGAL

The hydrological year
(01.10.2016 to 30.09.2017),
with a total of accumulated precipitation of
621.8 mm
(70% less than normal),
was the ninth lowest since 1931.

The combination of values well below the normal precipitation and temperature far above the normal, maximum temperature in particular, has resulted in the occurrence of **high values of evapotranspiration and low levels of water in the ground.**



2017



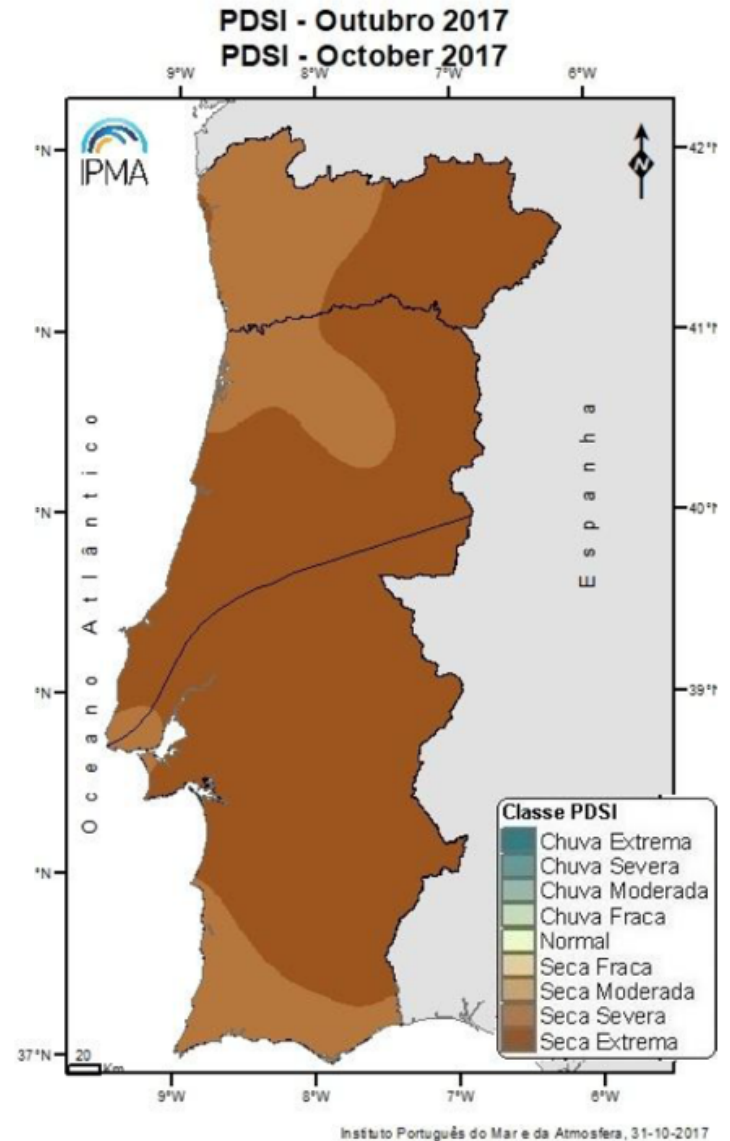
Normal
Weak Drought
Moderate Drought
Severe Drought
Extreme Drought

October 2017 was the hottest
of the last
87 years

24,8%
of the territory was in severe
drought

75,2%
of the territory was in
extreme drought

Usually, on previous situations of drought, in early autumn there was a significant reduction of the severity. On the contrary, last fall there was [a worsening of greater severity classes.](#)



A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



DN
Diário de Notícias

Pior concentração de carbono
em 800 mil anos PÁGS. 4 A 7

**PORTUGAL JÁ SOFRE
SECAS CADA VEZ
MAIS PROLONGADAS**

TERÇA-FEIRA | 31.10.17 | WWW.DN.PT

Ano 153.^o
N.º 54 250
1,20 euros

Director Paulo Baldia Director adjunto Paulo Tavares
Subdirectores Joana Petiz e Leonídio Paulo Ferreira
Director de arte Pedro Fernandes

The dams weren't used to produce energy ...

Country's Worst Carbon FootPrint ever

A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



→ The severe decrease in the volume of available water caused the increase of **water quality deterioration** at the sources.

→ Given the weather conditions – severe drought - and as the reservoirs were **also used for agriculture purposes**, there was continuous, and persistent, **decreasing in the volume of water available to both uses.**

A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



In some municipalities, during fall and winter time, water was being transported, in

112 daily loads,

through a 54 miles distance, by

27 tankers - 25 m³ each





A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



WILDFIRES

JUN → OCT 2017



A YEAR OF EXTREMES

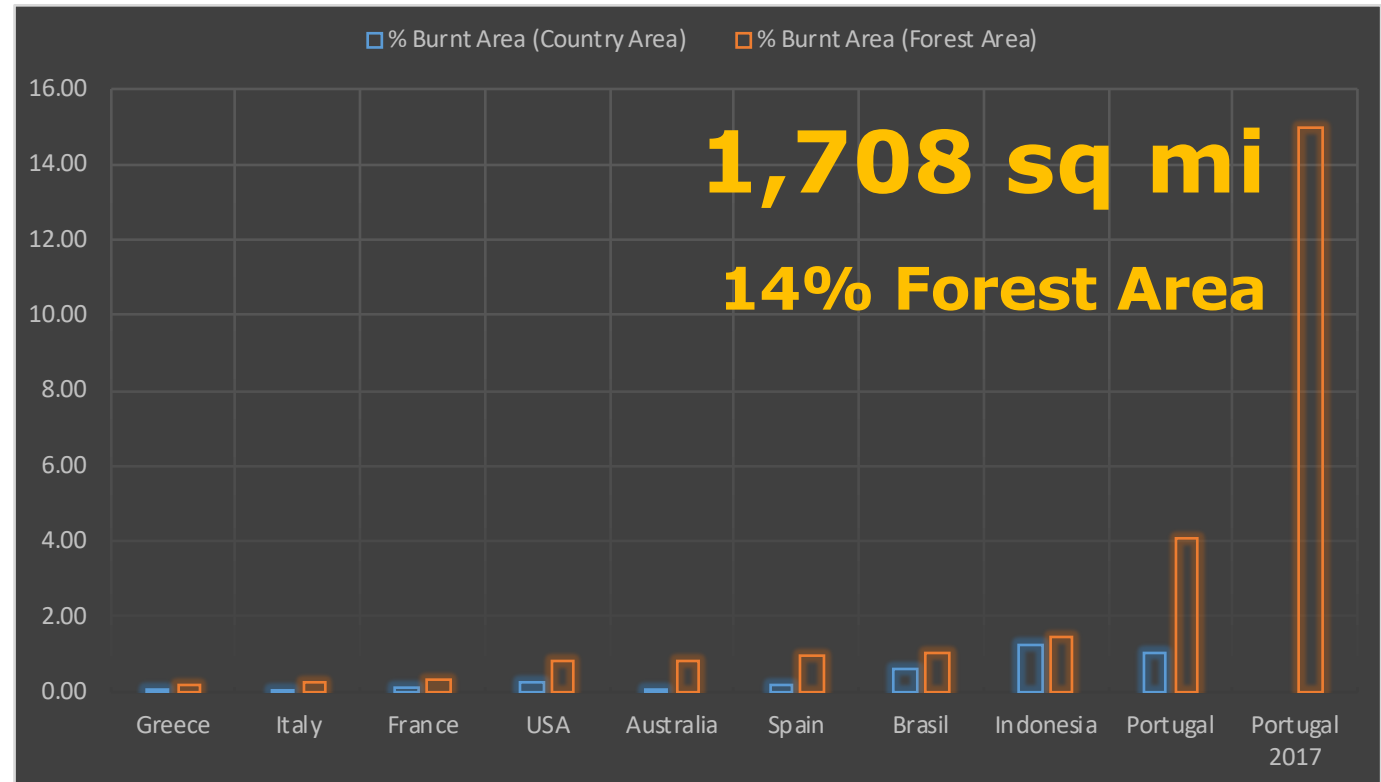
EXTREME DROUGHT

2016 → FEB 2018



WILDFIRES

JUN → OCT 2017



The wildfires in 2017 caused at least **109 dead** and more than **300 injured**.

A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



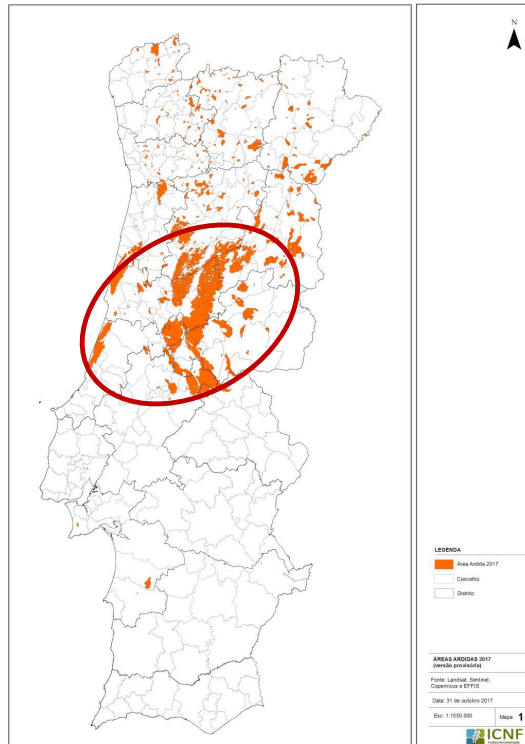
WILDFIRES

JUN → OCT 2017



PORTUGAL

Burned Area
1,708 sq mi
(2017)



CALIFORNIA

Burned Area
2,557 sq mi
(2018)

2018 California wildfires



- 1 Garner Complex 4 Mendocino Complex
- 2 Natchez Fire 5 Ferguson Fire
- 3 Carr Fire

Satellite image of the wildfires burning in Northern California and in southern Oregon, on August 1, 2018, smoke is can be seen trailing northeastward over Nevada, Oregon, Washington, and Idaho

Statistics

Total fires	6,721
Total area	1,508,556 acres (6,104.91 km ²)

A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



WILDFIRES

JUN → OCT 2017



Portugal is 4,4 times *smaller* than California

California is approximately 163,696 sq mi,
while Portugal is approximately 36,621 sq mi.



A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



WILDFIRES

JUN → OCT 2017



Despite the cooperation protocol of EPAL and the National Civil Protection Authorities for support in fighting fires and in providing free access and use of water in it's water supply infrastructures...



In some cases,
there was not
enough water to
extinguish the fire
and to supply the
populations



A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



WILDFIRES

JUN → OCT 2017



Despite the cooperation of EPAL and the National Civil Protection Authorities for protection support of it´s infrastructures...

196
Damaged Sites



A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



WILDFIRES

JUN → OCT 2017



ASHES POLLUTION

FEARS



ALERTA ⚠ Especialistas avisam que qualidade da água vai piorar devido aos incêndios e rede pública pode ser afetada **MOTIVO** ⚡ Chuvadas arrastam cinzas para bacias hidrográficas desde a região Norte até ao Tejo

BERNARDO ESTEVES/
SÓNIA TRIGUEIRÃO

As cinzas dos grandes incêndios da semana passada vão chegar aos rios e barragens que abastecem a po-

dade da água vai piorar", mas acredita que não haverá problemas no controlo dessa situação. "As cinzas são arrastadas para cursos de água e muitas vezes chegam a pontos onde há

situações críticas e estão em curso medidas de monitorização em caso de precipitação significativa", afirma fonte do Governo, que admite condicionar o uso da água: "Eventuais

PORMENORES

Medidas preventivas
Paulo Lucas, da Associação Zero, defende a construção nas linhas de água de "pequenos diques com madeira para diminuir a velocidade da água e conter a erosão dos solos".

Crédito na fatura da água pelo combate a fogos de dia 15

Para "minimizar os custos" dos municípios que viram o consumo de água aumentar, devido ao combate aos incêndios de dia 15, o consumo em

A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



WILDFIRES

JUN → OCT 2017

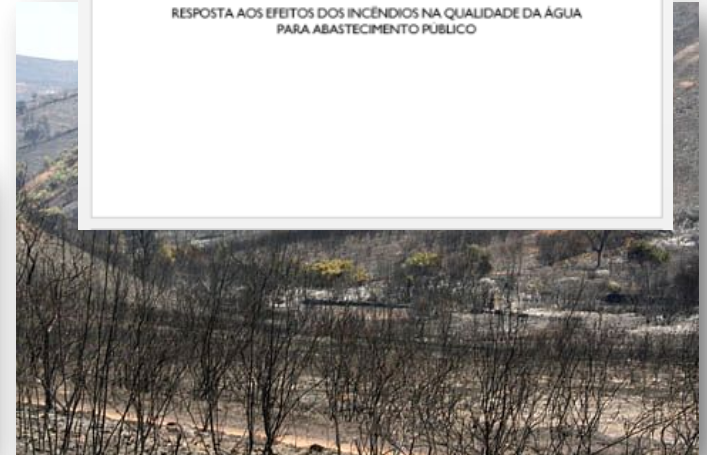


ASHES POLLUTION FEARS



Contacts were made with official entities and NGO's to define and implement adequate measures in order to prevent soil erosion in the burnt areas:

- Creating carpets with vegetable waste;
- Creating trenches;
- Creating natural barriers with burnt logs.



A YEAR OF EXTREMES

EXTREME DROUGHT

2016 → FEB 2018



WILDFIRES

JUN → OCT 2017



ASHES POLLUTION

FEB 2018 → ...



WILDFIRES COMPROMISED, and still compromise, WATER QUALITY AFTER ACTIVE BURNING, AND CONSEQUENTLY, THE WATER SUPPLY

Following intense rain,
ashes caused:

- **Water pollution;**
- **Elevated turbidity and total suspended solids;**
- **High stress on the Water Treatment Plants**



A YEAR OF EXTREMES

- Severe Drought
- Devastating Wildfires
- Ashes Pollution

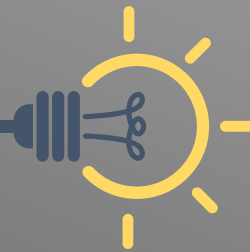




EPAL

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LESSONS LEARNED



STRATEGIC PLAN FOR CLIMATE CHANGE

SHORT, MEDIUM AND LONG TERM MEASURES

	CLIMATE VULNERABILITY	NON CLIMATE VULNERABILITY
WATER AVAILABILITY	DROUGHT	USE CONFLICTS HIGH WATER LOSSES
WATER QUALITY	DROUGHT INTENSE RAIN AND FLOOD WILDFIRES	WATER POLLUTION
ASSET INTEGRITY	INTENSE RAIN AND FLOOD WILDFIRES	GEOLOGICAL RISK

WATER & WASTEWATER

MEASURES TAKEN



**INFRASTRUCTURES
REFURBISHMENT**



WATER LOSS REDUCTION



REDUCING AFLUENCES



**INFRASTRUCTURES
PROTECTION**



**INSTITUTIONAL
ARTICULATION**



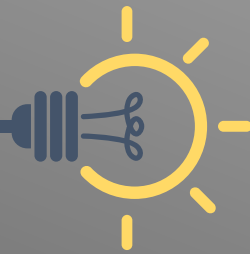
**SYSTEMS
INTERCONNECTING**



NEW SOURCES

WATER SUPPLY

LESSONS LEARNED

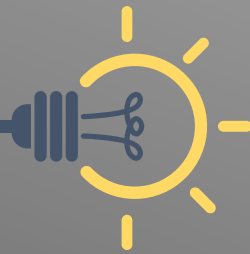


WATER SUPPLY WASTE WATER

- Rehabilitation of water wells out of use;
- Promote new, and deeper, underground extractions;
- Promote, together with the official entities, the efficient control of the integrated management of aquifers;
- Aquifers artificial recharge;
- Creating connections to existing systems;
- Creating alternative municipalities supply connections;
- Promote the waste water reuse, namely in irrigation;
- Support municipalities in order to reduce water loss and water consumption.



LESSONS LEARNED



STRATEGIC PLAN FOR CLIMATE CHANGE



WATERBEEP® is a service that provides information about water consumption with an alert service that will be sent whenever there is a different water consumption than usual

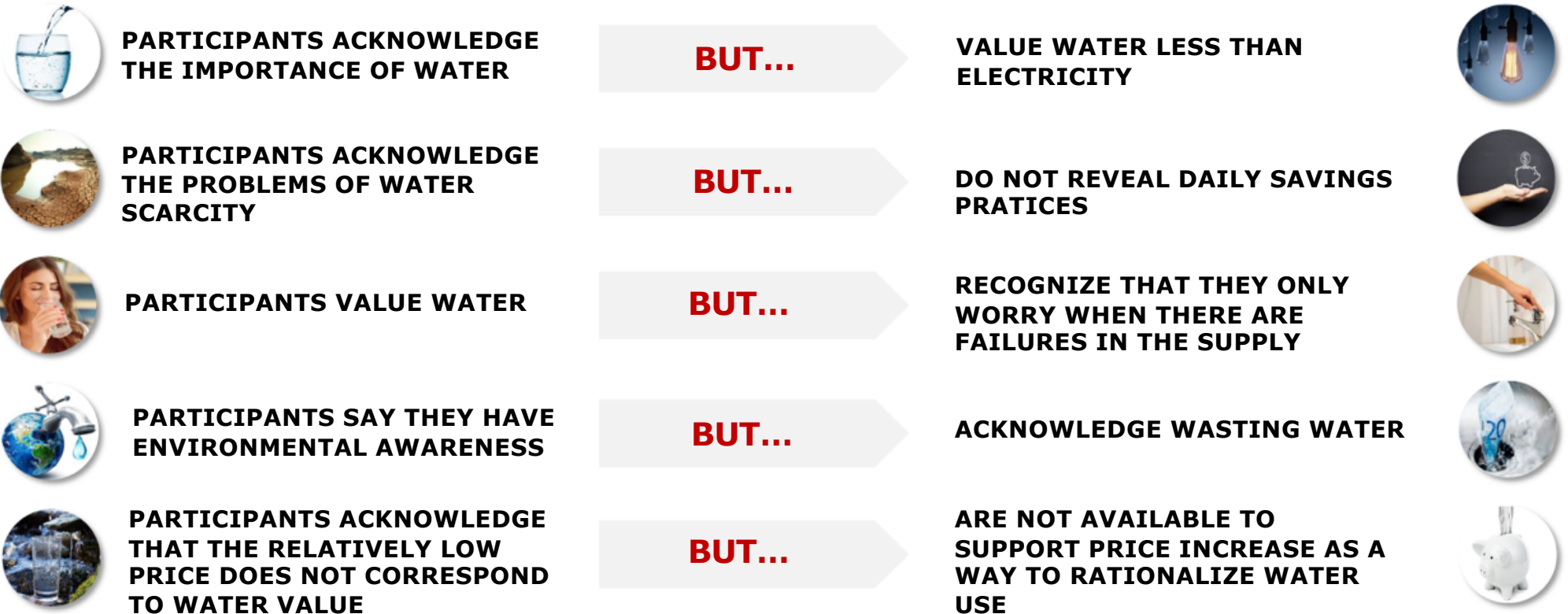


WONE® is a system that, based on the implementation of monitoring and control zones and the analysis of the respective flow and pressure data, allows to combine processes and integrate relevant information for network management and water loss control

ATTITUDES AND BEHAVIORS REGARDING WATER USE

The prevalent convictions demonstrate the existence of dissonance between attitudes and behavior..

LESSONS LEARNED

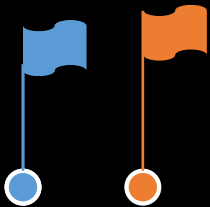
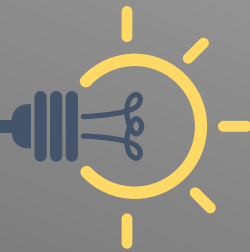




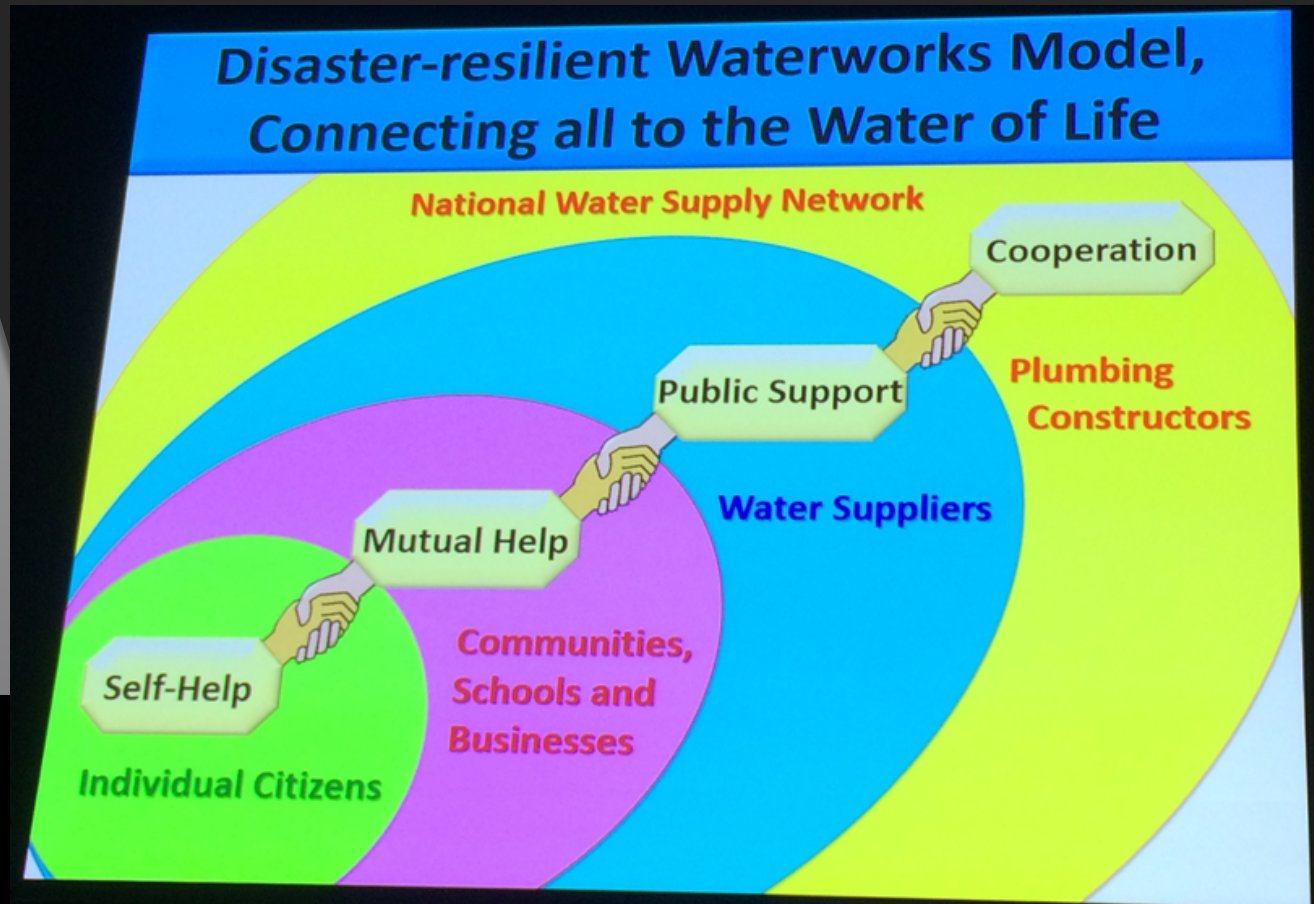
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LESSONS LEARNED



SOCIAL RESILIENCE







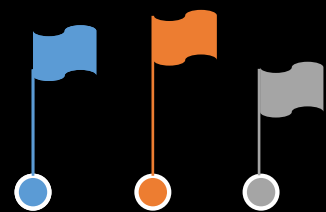
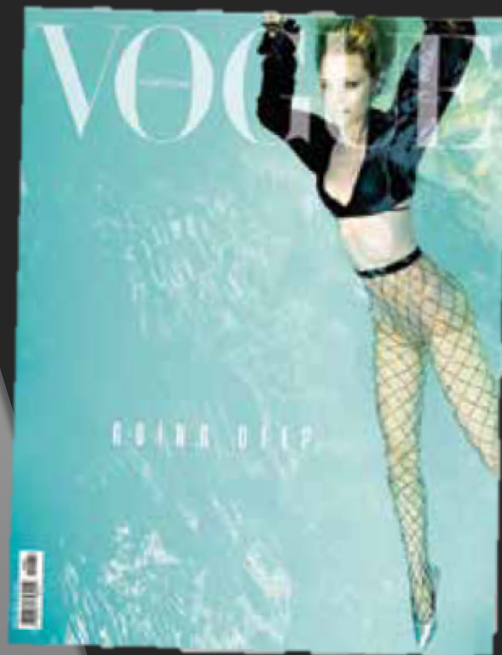
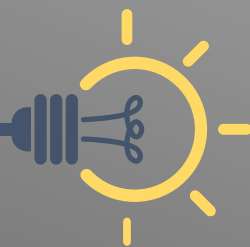
Águas Livres Aqueduct



Mother of Water Museum

Jogging – Cycling – Slide

LESSONS LEARNED



MAKE WATER A "SEXY" SUBJECT



A comunidade aderiu, muito sorridente, a mais uma iniciativa da EPAL

Aguadeiro pronto para a ação



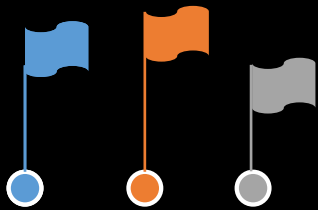
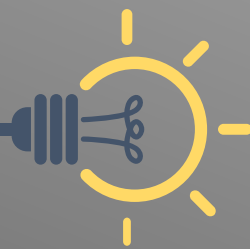
3 sorrisos, 3 copos de água



A iniciativa arrancou em junho na Avenida da Liberdade, em frente à sede da EPAL



Água gratuita, simples ou aromatizada, para agradar a todos os paladares



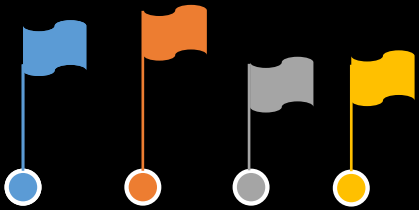
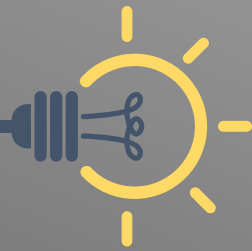
MAKE WATER A "SEXY" SUBJECT



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LESSONS LEARNED

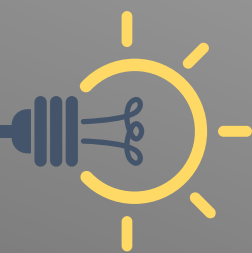


COMMUNICATIONS

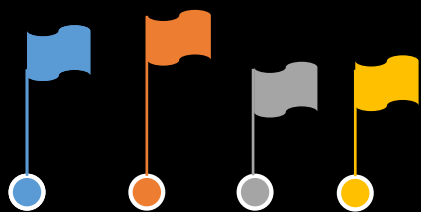


"Call IT!"

LESSONS LEARNED

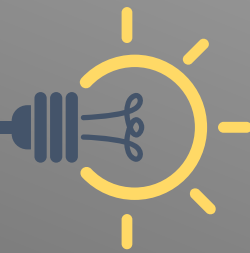


- *When to communicate?*
- *Media Training*



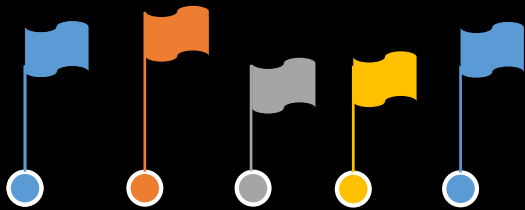
COMMUNICATIONS

LESSONS LEARNED

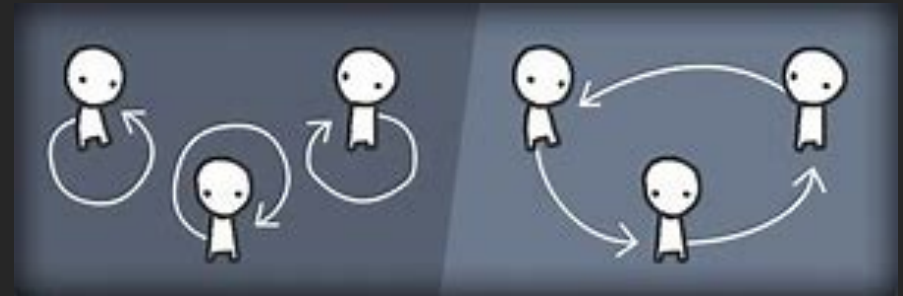


The **diversity and complexity of shock events** and increased **interdependencies** between systems, continue to pose new concerns that need to account for.

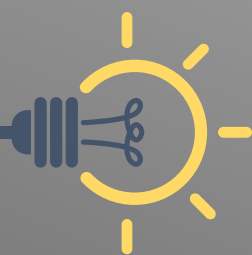
Identifying interdependencies, among and between sectors, is crucial to understand, and to deal with, the critical risks.



INTERDEPENDENCIES



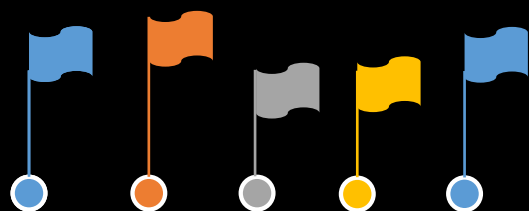
LESSONS LEARNED



Within the framework of the International Strategy, Portugal has developed its own National Platform for Disaster Reduction, that integrates entities from both public and private sector, including EPAL.

- IDENTIFY AND MAP INTERDEPENDENCIES;
- OUTLINE AVAILABLE RESOURCES;
- DEFINE PRIORITIES;
- SET PROTOCOL MODELS;
- PROPOSE A MODEL OF RESPONSE ARTICULATION (NATIONAL, REGIONAL AND MUNICIPAL)

2018-2020



INTERDEPENDENCIES



**Difficulties mastered
are opportunities
won**

Winston Churchill

Thank You!

www.epal.pt

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