

**“Contingency Management in water
supply systems –
The EPAL´s Experience”**



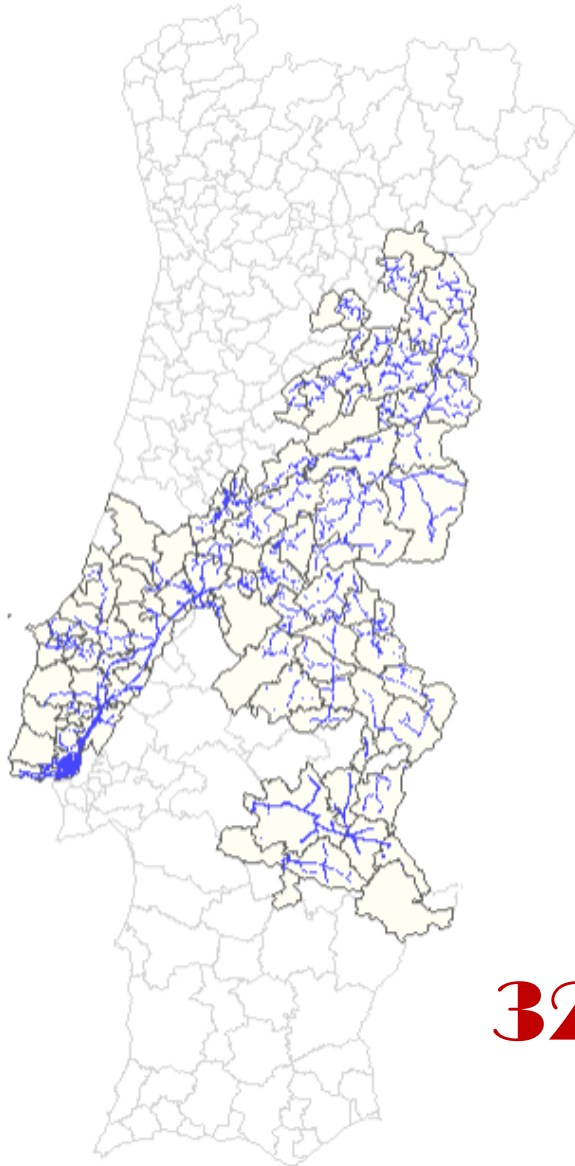
EPAL

Grupo Águas de Portugal

Alexandra Cristóvão
W-SMART Workshop
Amsterdam 03-04.11.2017

1. EPAL

1. EPAL



EPAL is a public sector company. It's the oldest, 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

32.500

km²

2.200

infrastructures
/ sites

2. Managing Risk

2. Managing Risk



→ PROCESS GOALS

Along with W-SMART, EPAL has defined a methodology towards an efficient and effective crisis management and, simultaneously, developed a culture of prevention.

This partnership has contributed to the sharing and learning of the best international practices in the field of crisis management.

→ PRELIMINARY AND CONTINUOUS ANALYSIS

EPAL has undertaken risk analysis regarding this framework and specifically in what regards to:

- **Improving its infrastructure security;**
- **Enhancing the capacity of the supply systems stretching from the water source to the end user – Water Safety Plan;**
- **Assuring the resilience of critical features of infrastructures;**
- **Developing information systems and information security systems.**

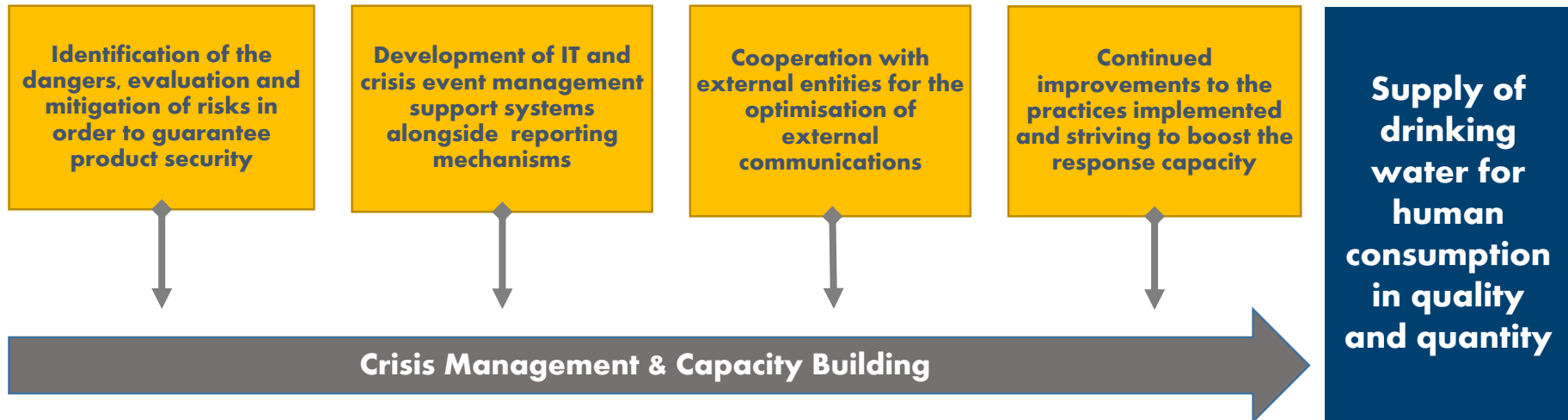


2. Managing Risk



EPAL

Grupo Águas de Portugal



COLLECTION



TREATMENT



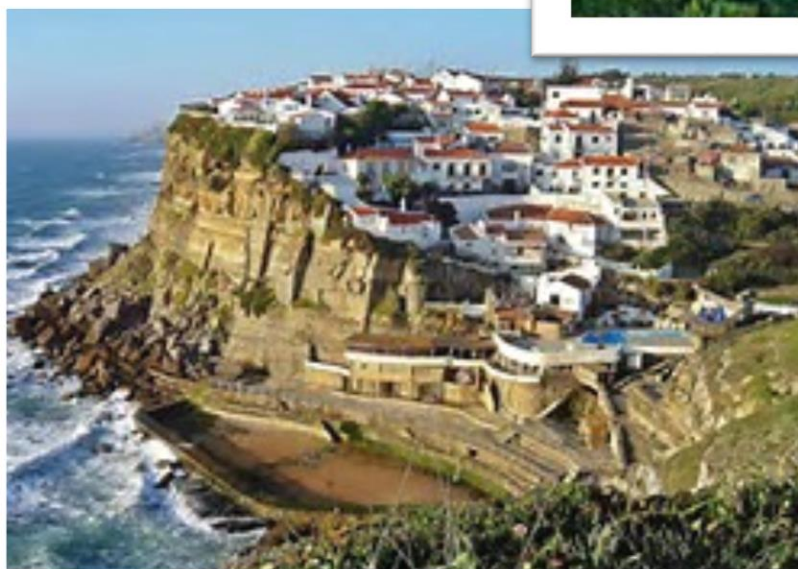
DISTRIBUTION



CONSUMERS

3. Present Situation

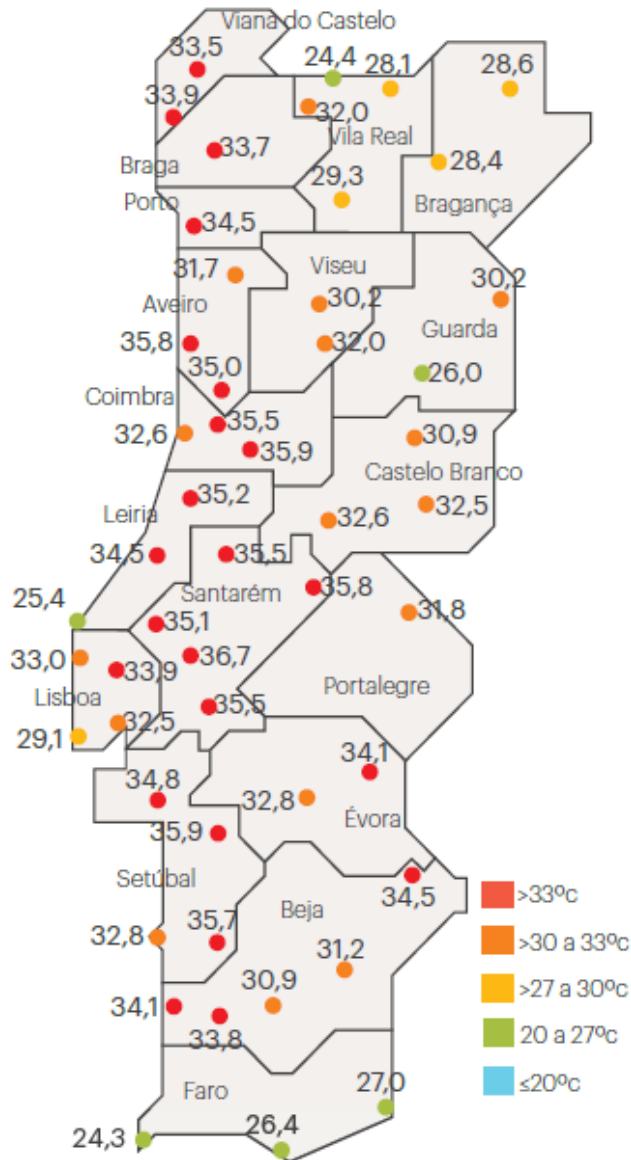
3. Present Situation – General data



3. Present Situation – General Data



3. Present Situation - Climate



87

**It has been the driest year in 87 years
It has been the hottest October in 87
years**

27,49

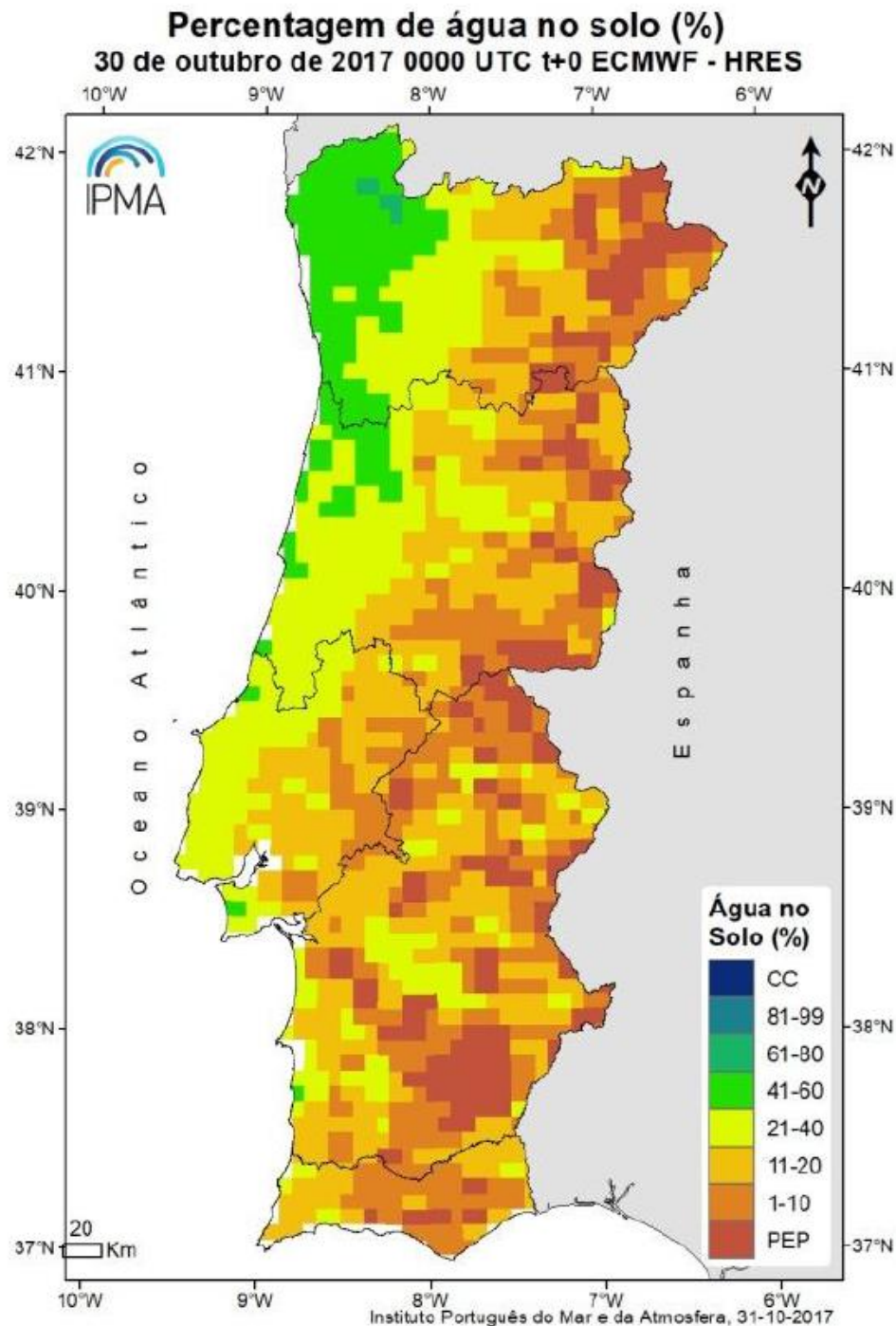
**degrees Celsius was the average
maximum temperature recorded in
September in the country, which
represents 1.20 degrees above
normal**

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

Additionally the period from 01.04.2017 to 30.09.2017 was **extremely dry**, with monthly precipitation amount values always below the average value.

This semester, the average maximum temperature, 27.72° C was the highest since 1931 and the mean value of the average temperature the second highest (after 2005).

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.



3. Present Situation – Meteorological Drought



Normal

Weak Drought

Moderate Drought

Severe Drought

Extreme Drought

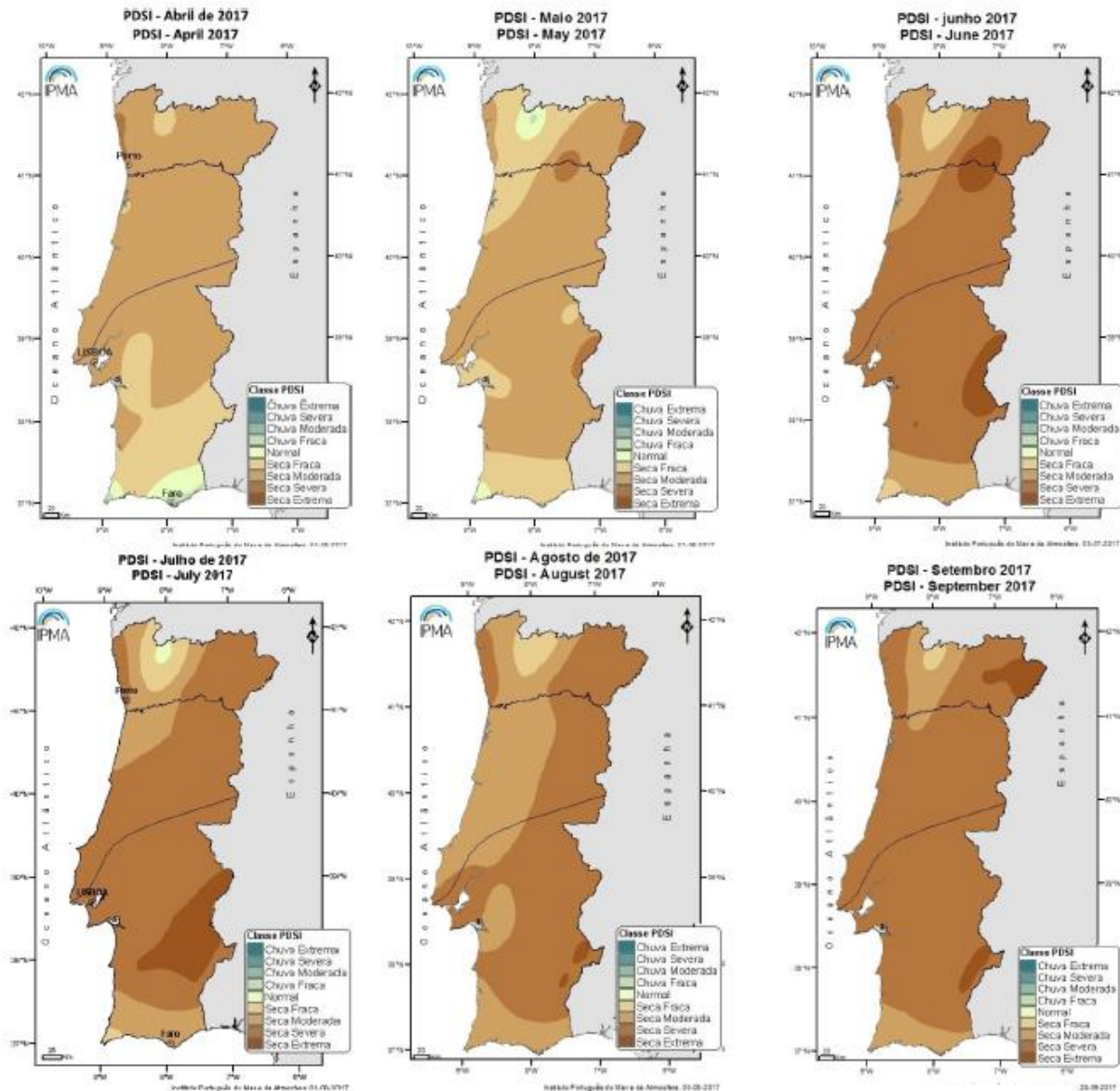


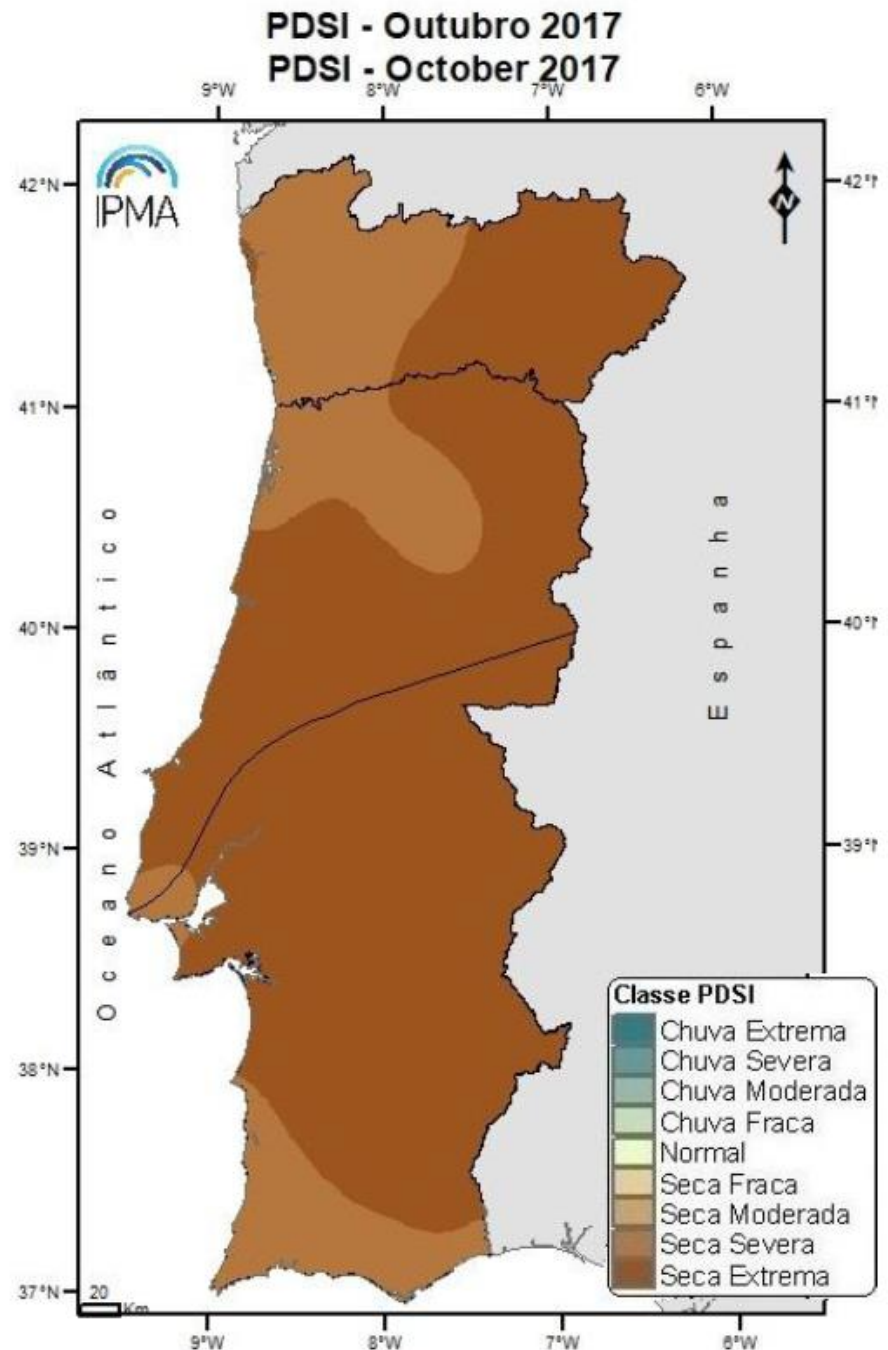
Figura 1 – Distribuição espacial do índice de seca meteorológica

3. Present Situation

October 2017 was the hottest of the last 87 years, classified as extremely dry. The average value of maximum air temperature was the highest since 1931, approximately 5° C above the normal value.

According to the meteorological index of drought PDSI, about 24,8.0% of the territory was in severe drought and 75,2% in extreme drought.

In early autumn, on previous, situations of drought was found a significant reduction of the severity (severe and extreme classes). On the contrary, in the current situation it was found in the same period a worsening of greater severity classes.



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

Diretor Paulo Baldaia **Diretor adjunto** Paulo Tavares
Subdiretores Joana Petiz e Leonídio Paulo Ferreira
Diretor de arte Pedro Fernandes



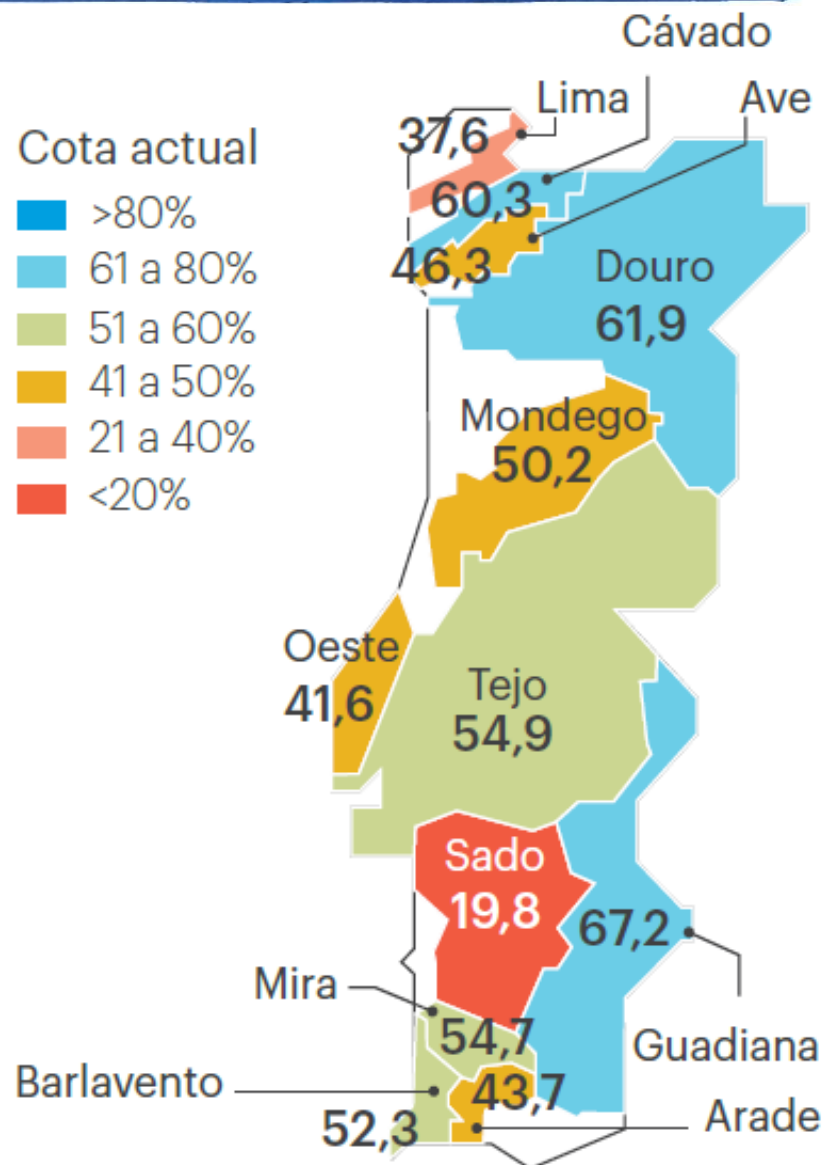


3. Present Situation – Reservoirs

Of the 61 reservoirs monitored, 27 had water storage levels less than 40% of their ability.

In just 20 days, 10 reservoirs have reduced the volume of water stored and only 2 had a slight increase in volume, DOURO and SADO (in this case this is due to water transfers from the ALQUEVA and the reduction of the volumes needed for irrigation).

15 dams were at critical levels, with 20% water or less and the most critical values belong to MONTE ROCHA (8%) and VIGIA (10%) reservoirs.



3. Present Situation – Reservoirs

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[DADOS SINTETIZADOS](#)
[DADOS DE BASE](#)
[GRANDES NÚMEROS](#)
[MEDIATECA](#)
[RELAÇÕES INTERNACIONAIS](#)
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Boletim de Armazenamento nas Albufeiras de Portugal Continental.

[Mapas anuais](#)

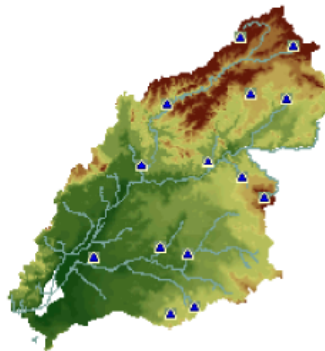
[Resumo](#)

[Imprimir Resumo](#)



Situação das Albufeiras em Setembro de 2017 na bacia TEJO.

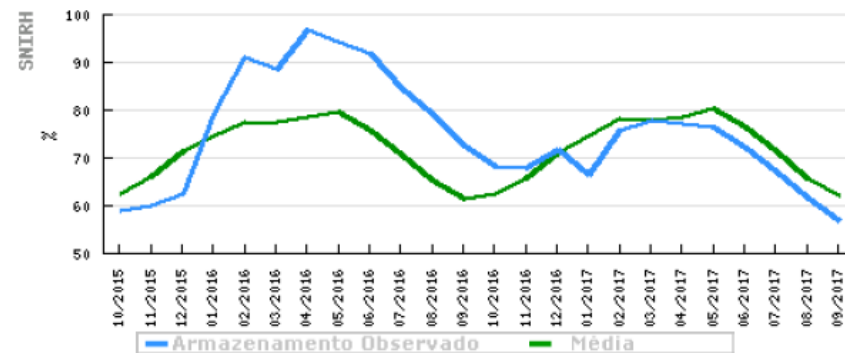
Armazenamento em Setembro de 2017	Número de albufeiras	Albufeiras (percentagem armazenamento)
superior a 80%:	0	
entre 50% e 80%:	6	Apartadura (77.9%), Castelo de Bode (77%), Idanha (50.3%), Meimoa (52%), Pracana (52.9%) e Sta Águeda - Marateca (77.8%)
inferior a 50%:	8	Cabril (41.3%), Cova do Viriato (45.7%), Divor (7.2%), Magos (34.3%), Maranhão (23.6%), Minutos (47%), Montargil (42.6%) e Póvoa (48.5%)



Localização da bacia:



Evolução do armazenamento na Bacia TEJO.



Volumes Armazenados (10^6 m^3)

Percentagem (%)

Dados em tabela

Evolução do Armazenamento nas albufeiras da Bacia TEJO em Setembro

3. Present Situation – Reservoirs



gestão do Albufeiras

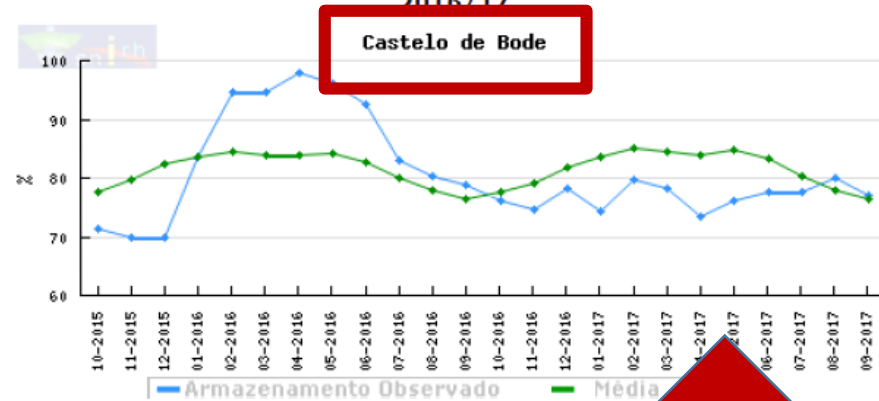
gestão do Albufeiras de Portugal Continental.

Mapas anuais

Resumo

Imprimir Resumo

evolução do armazenamento da Albufeira de nos Anos Hidrológicos 2015/16 e 2016/17



Volumes Armazenados (10^6 m^3)

Porcentagem (%)

Linha de Água: RIO ZÉZERE

Uso Principal: Abastecimento

Entidade Exploradora:

Tipo de Barragem:

Concelho:

Coordenada M (m):

Coordenada P (m):

Caudal de Dimensionamento do

Descarregador (m^3/s):

Volume Morto (10^3 m^3):

Nível Mínimo de Exploração (m):

Mais caracte

> 1 year supply

Like others, since May the dam hasn't been used to produce energy...

VIGIA

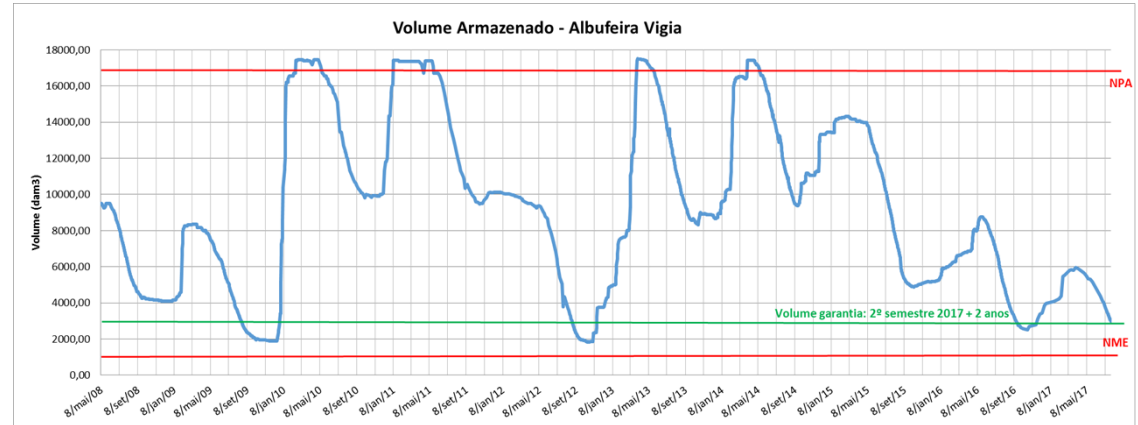


VIGIA

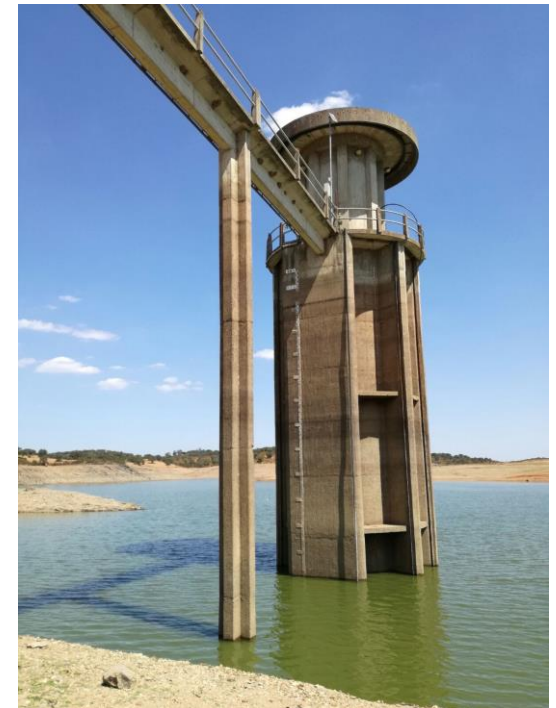


3. Present Situation – Vigia

Given the weather conditions – severe drought - and as the VIGIA Reservoir is **also used for agriculture purposes**, it has been seen continuous, and persistent, decreasing in the volume of water available to both uses.

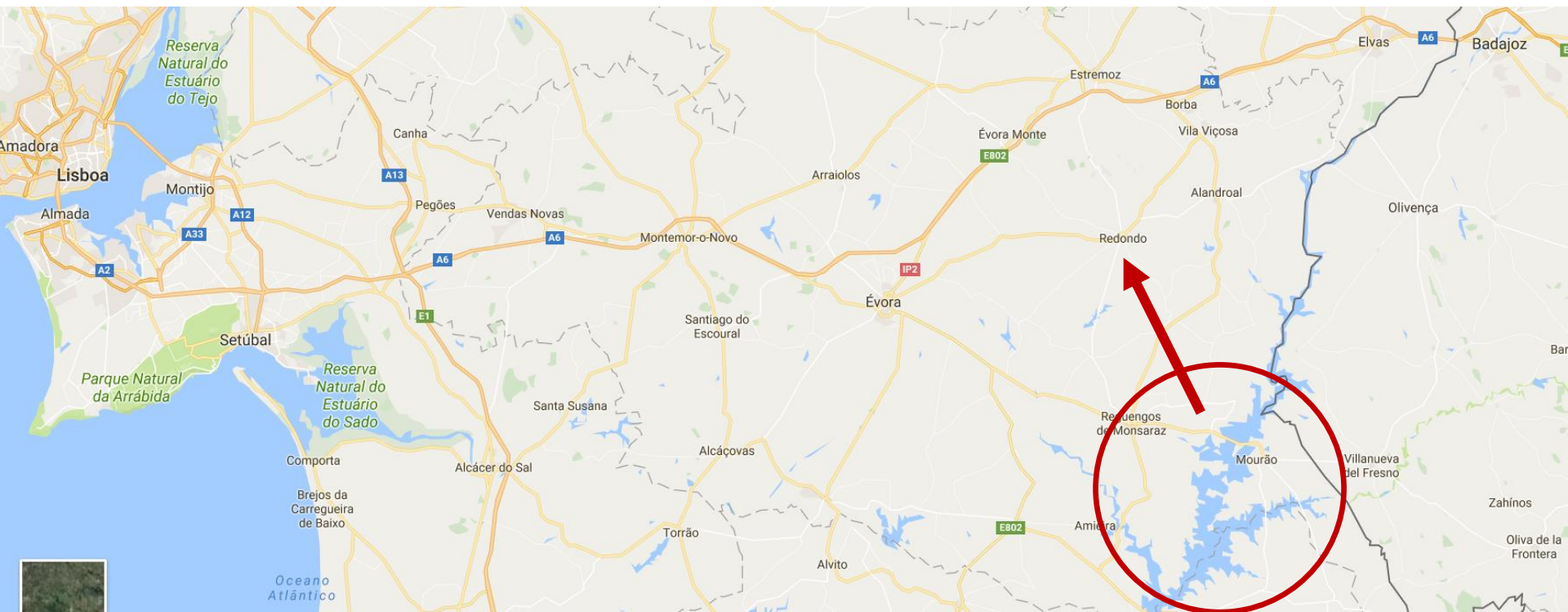


The severe decrease in the volume of available water caused the increase of **water quality deterioration** at the source.



3. Present Situation – Measures Taken

- **Strengthening the monitoring of the water quality;**
- **Commissioning the water transfer system from the ALQUEVA Reservoir;**
- **Reducing the water used for agriculture, if the transfer of water is not sufficient to compensate for the abstraction for irrigation (eventually, suspending the irrigation if the volume of water available matches within 2 years of water for human consumption);**
- **Mobilizing and operating existing water sources, whether belonging to the company or the municipalities involved and find new ones.**



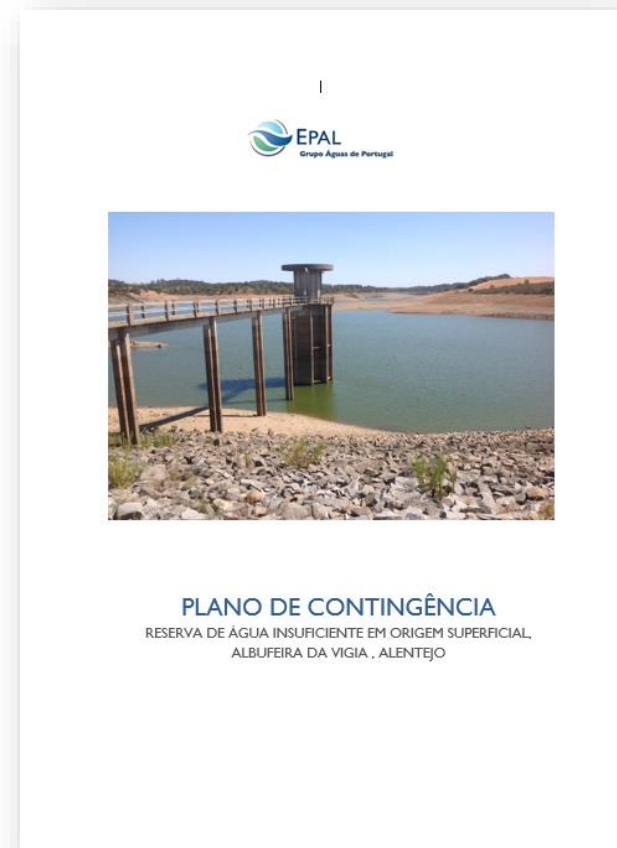
3. Present Situation – Measures Taken

- Together with the Portuguese Environment Agency (APA), **improvement of the measurement system** in all users/ consumption points;
- **Raise awareness** to the situation, among users and ministries involved, in order to promote the adoption of good agricultural practices to ensure a more efficient irrigation, minimizing the quantities used;
- Efforts development to **increase the efficiency in the processes of water transport and distribution** (there are still opportunities for improvement, particularly at the **level of irrigation systems** and at the **supply systems level**, in high and low-water distribution network, despite the efforts that have already been made.



3. Present Situation – Measures Taken

- **Definition of contingency plans for drought;**
- **Contacts with various official entities, including the regulator;**
- **Contact with security forces (civil protection, army), health entities and NGO´s;**
- **Contacts with municipalities for support;**
- **Developing campaigns in the media;**
- **Strengthening the supply ducts, allowing redundancy;**
- **Preparation of alternative supply channels (tanker trucks, trains, etc.).**



3. Present Situation – Measures Taken

- Project **ADAPTACLIMA-EPAL**, to provide the EPAL adaptation strategy in the medium and long term;
- Project **PREPARED – ENABLING CHANGE**, to the adaptation of cities to impacts of Climate Change and which main result was the Water Cycle Safety Plan

ADAPTACLIMA 



- Project **BINGO - Bringing INnovation to onGOing water management** with:
 - 10 year forecasts to 6 geographic areas;
 - Involvement of stakeholders in Knowledge Alliance;
 - Impact assessment of extreme events and AC on the water and their effects on key sectors of society;
 - Categorization of risk management measures, technologies and solutions for mitigation of impacts on the water cycle;
 - Creating a portfolio of adaptation measures integrating technological and management solutions
- Strategic plan for adaptation to climate change in **Águas de Portugal Group** (EPAL´s shareholder).



3. Present Situation – Viseu, Portugal

Due to drought, the municipalities of Viseu, Mangualde, Nelas e Penalva do Castelo advanced last week with an operation of buying and carrying water for the population supply.



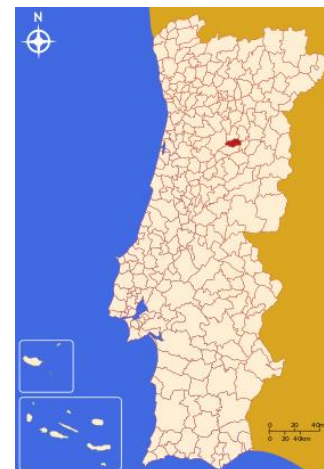
Viseu
~98.000
inhabitants



Mangualde
~20.000
inhabitants



Nelas
~14.000
inhabitants



P. do Castelo
~8.000
inhabitants

Water will be transported, in 112 daily loads, through a 88 km distance, by 27 tankers - 25 m³ each. The investment may reach ~€500.000/ month.





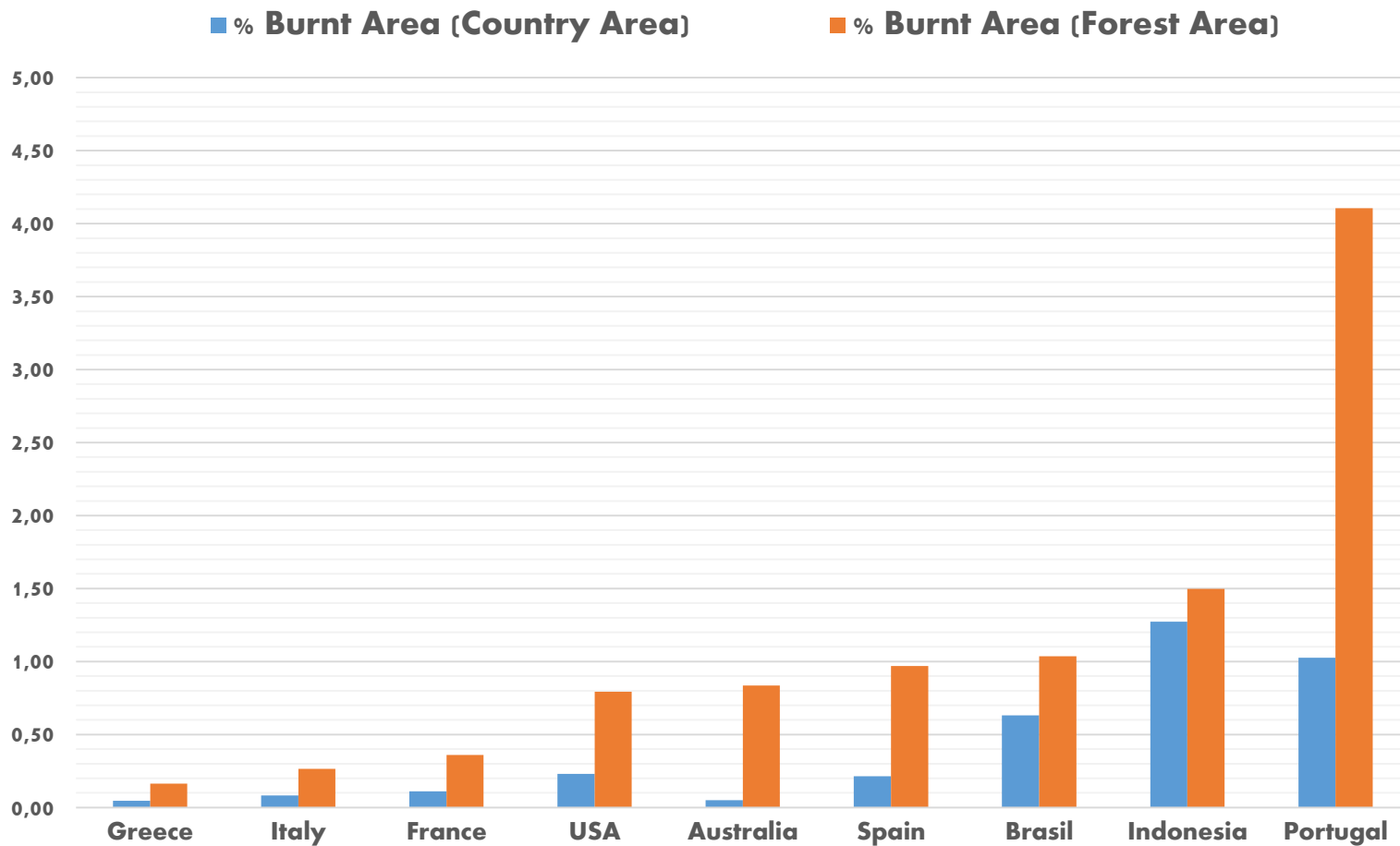






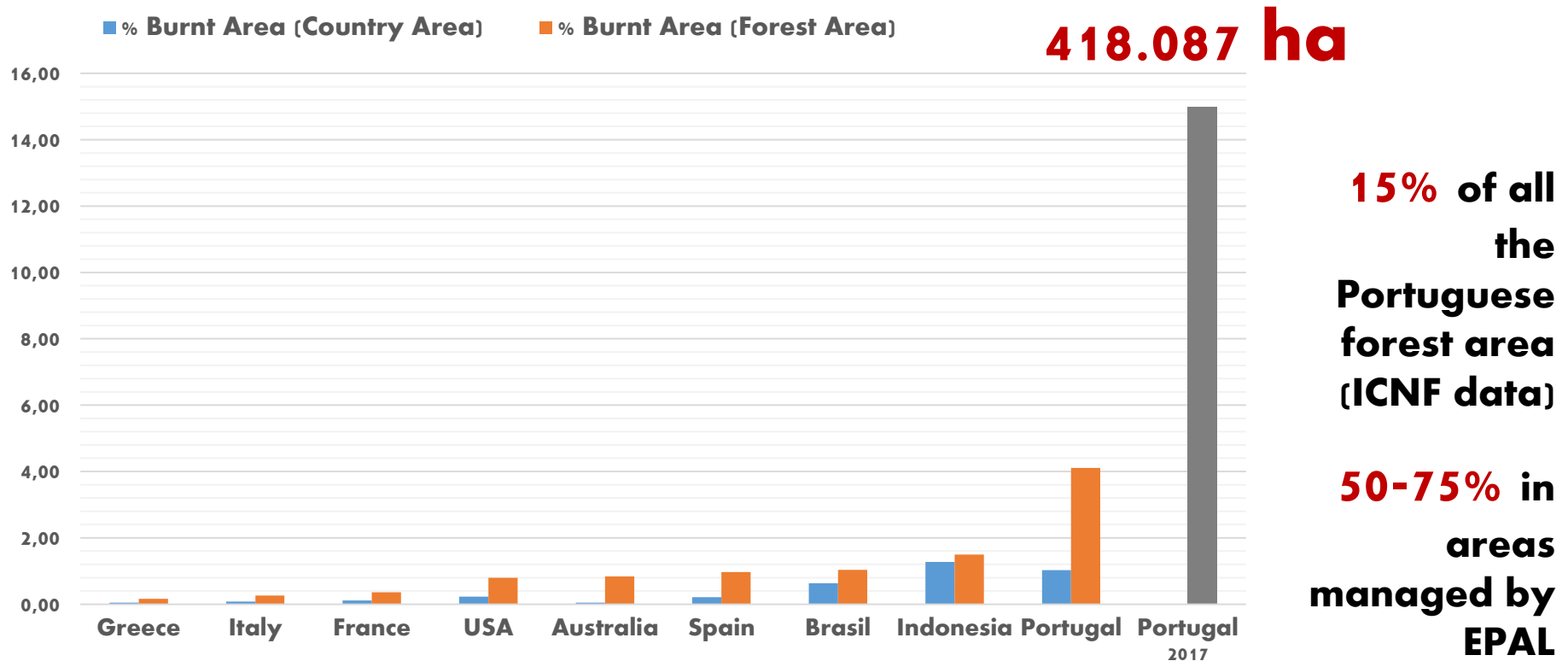


3. Present Situation – 2016 Data - Wildfires



Source: Global Forest Watch

3. Present Situation – 2016/7 Data - Wildfires



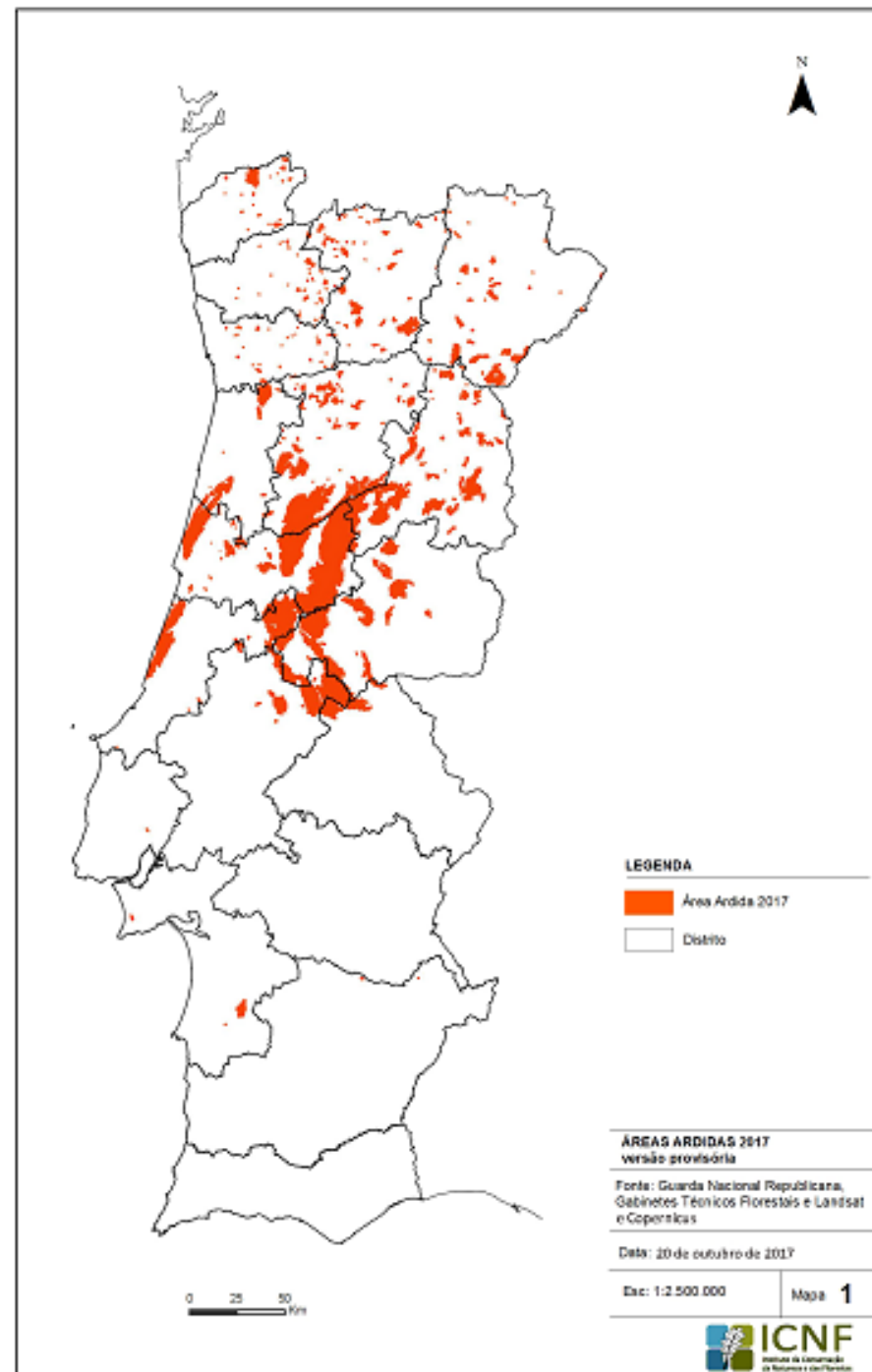
Sources: Global Forest Watch – 2016; ICNF - 2017

According to Global Forest Watch Portugal lost 4% of its forest area in 2016, accounting for 1/2 of the burnt forests in the European Union.

This year, the destruction of forest fires should be greater, because there were several moments of great fires.

The Institute for Forests and Nature Conservation (ICNF) counted, until the 16th of October, 418.087 hectares of forest destroyed by fire, this year.

Almost 200.890 hectares burned in October, and on the 15th, the worst day of the year in number of fires, ~500.





***"The Death Road"* – Pedrogão Grande – June 2017**

3. Present Situation – Wildfires 2017

The 500 fires in October 15th caused at least 45 dead and about 70 injured. This was the second most serious situation of wildfire in Portugal, after Pedrogão Grande, in June this year, when a fire provoked, 64 dead and more than 250 wounded.

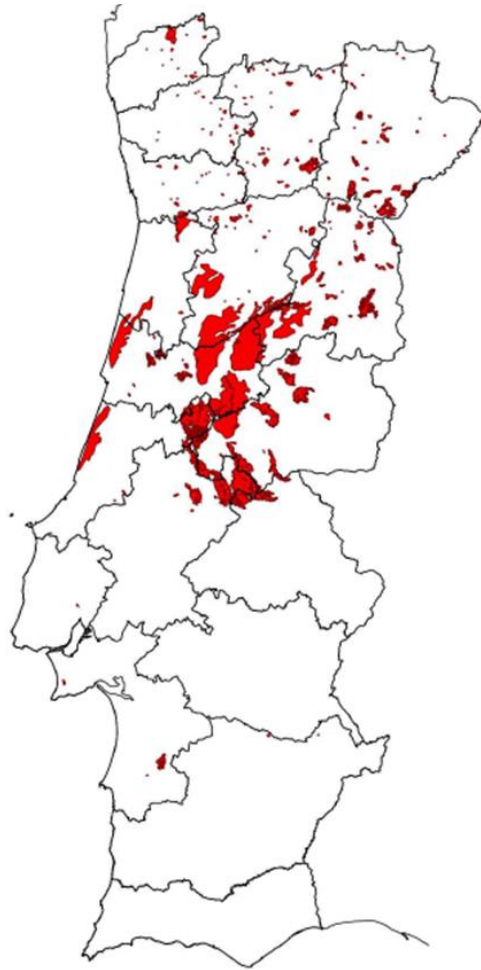
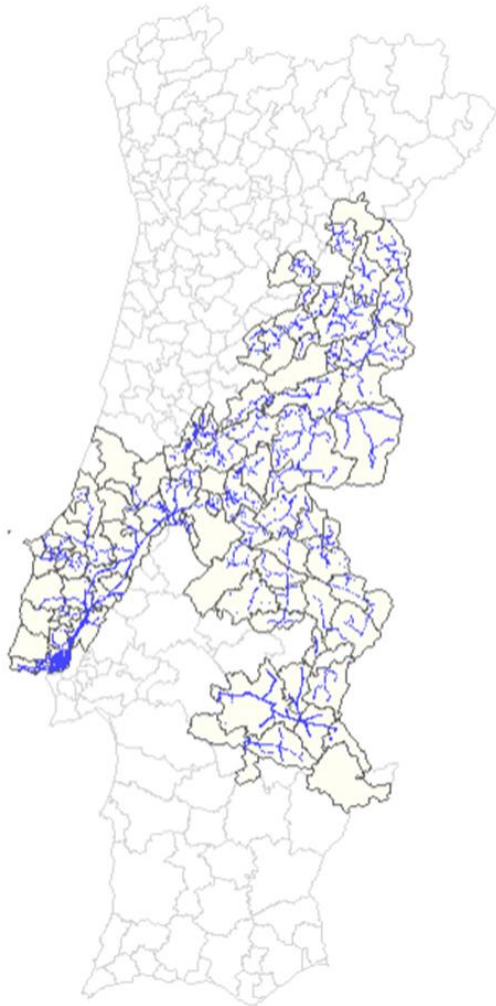


3. Present Situation – Existing Protocols

- **Cooperation protocol of EPAL and the: Institute for Forests and Nature Conservation (ICNF); the National Civil Protection Authority (ANPC) and the National Republican Guard (GNR); for support in fighting fires;**
- **Defined water supply spots, assuring territorial provision in each region, regarding the value of the forest area involved and the risk of fire;**
- **The protocol assures the cooperation of EPAL in providing free access and use of water, in it's water supply infrastructures.**



3. Present Situation – EPAL's affected area



Legenda:

- Municípios servidos pela A2VT - Abastecimento de Água
- Municípios servidos pela A2VT - Abastecimento de Água e Saneamento de Águas Residuais



3. Present Situation – EPAL´s affected area



**Damaged
Infrastructures:**

196





ATUALIDADE I

**CHAMAS
ASSASSINAS**

GESTÃO | **PRESIDENTE TOMA POSSE**

O engenheiro florestal Tiago Martins de Oliveira, de 48 anos, toma hoje posse como presidente da Estrutura de Missão para a Instalação do Sistema de Gestão Integrada de Fogos Rurais. A estrutura foi criada no Conselho de Ministros de sábado e funcionará na dependência de António Costa.

AMBIENTE

Cinza dos fogos ameaça qualidade da água

FIRE ASHES THREATEN WATER QUALITY

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

idade da água vai piorar”, mas acredita que não haverá problemas no controlo dessa situação. “As cinzas são arrastadas para cursos de água e muitas

situações críticas e estão em curso medidas de monitorização em caso de precipitação significativa”, afirma fonte do Governo, que admite condicio-

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,

3. Present Situation – ASHES vs WATER QUALITY

Wildfires can compromise water quality during active burning, and after, for a long term, and consequently the water supply.

The impacts of a wildfire on watershed, and subsequently water quality, can be unpredictable and depend of different variables - geology, soil properties, topography, vegetation, fire severity, weather patterns, land use practices, watershed size, terrain slope, etc..



3. Present Situation – ASHES vs WATER QUALITY

We are now facing several challenges:

- **Ashes transport, sediment and debris, following intense rain;**
- **Changes and variability in source water quality – pH, alkalinity, total organic carbon, nitrate, metals, other nutrients and constituents;**
- **Debris can reduce flow into water plant intakes;**
- **Increased sediment mobilization → Elevated turbidity and total suspended solids;**
- **Capacity of the Water Treatment Plants to treat the water;**
- **Colour, taste and odour problems may occur, or worsen.**



3. Present Situation – ASHES vs WATER QUALITY

Alcobaça, Portugal – 18.10.2017

> Home > Notícias

SERVIÇOS MUNICIPALIZADOS DE ALCOBAÇA - AVISO



SERVIÇOS MUNICIPALIZADOS DE ALCOBAÇA

18/10/2017

Os Serviços Municipalizados de Alcobaça informam os consumidores residentes em Pataias, Martingança, Burinhosa, Paredes da Vitória, Légua, Falca, Água de Madeiros, Pedro do Ouro e Vale acerca do transporte de cinzas, resultantes dos incêndios na freguesia de Pataias e Martingança, para a rede pública de água devido às chuvas desta segunda e terça-feiras.

Sendo uma preocupação dos Serviços Municipalizados de Alcobaça garantir a qualidade da água para consumo humano em todo o concelho, mais se informa que já efetuámos a análise e respetiva desinfecção da água. Todavia, solicita-se a colaboração das pessoas no sentido de não beberem água da torneira sem ser fervida podendo ser utilizada para banhos e cozeduras.

Estamos a desenvolver todos os esforços necessários no sentido de repor a normalidade no abastecimento de água, pelo que pedimos a compreensão de todos.

Partilhar Imprimir Voltar Atrás Voltar ao Topo

▶

NEWSLETTER

Registe-se e receba a nossa newsletter .

Subscrever

INFORMAÇÕES ÚTEIS**LINKS ÚTEIS**

Comunicação de Leituras



Peça já a sua fatura electrónica da Água

"... don't drink tap water without being boiled ... can be used for baths and cooking."

3. Present Situation – Contingency Plans

Inputs:

- **Burnt areas and involving landscape;**
- **Location of water sources/ catchment and the respective watersheds in, or near, burnt areas.**

In addition to the above, the impacts for water treatment depend essentially in:

- The **volume and configuration** of the reservoir/ river basin;
- The characteristics of the **catchment systems**;
- The features and resilience of the **water treatment plants**.

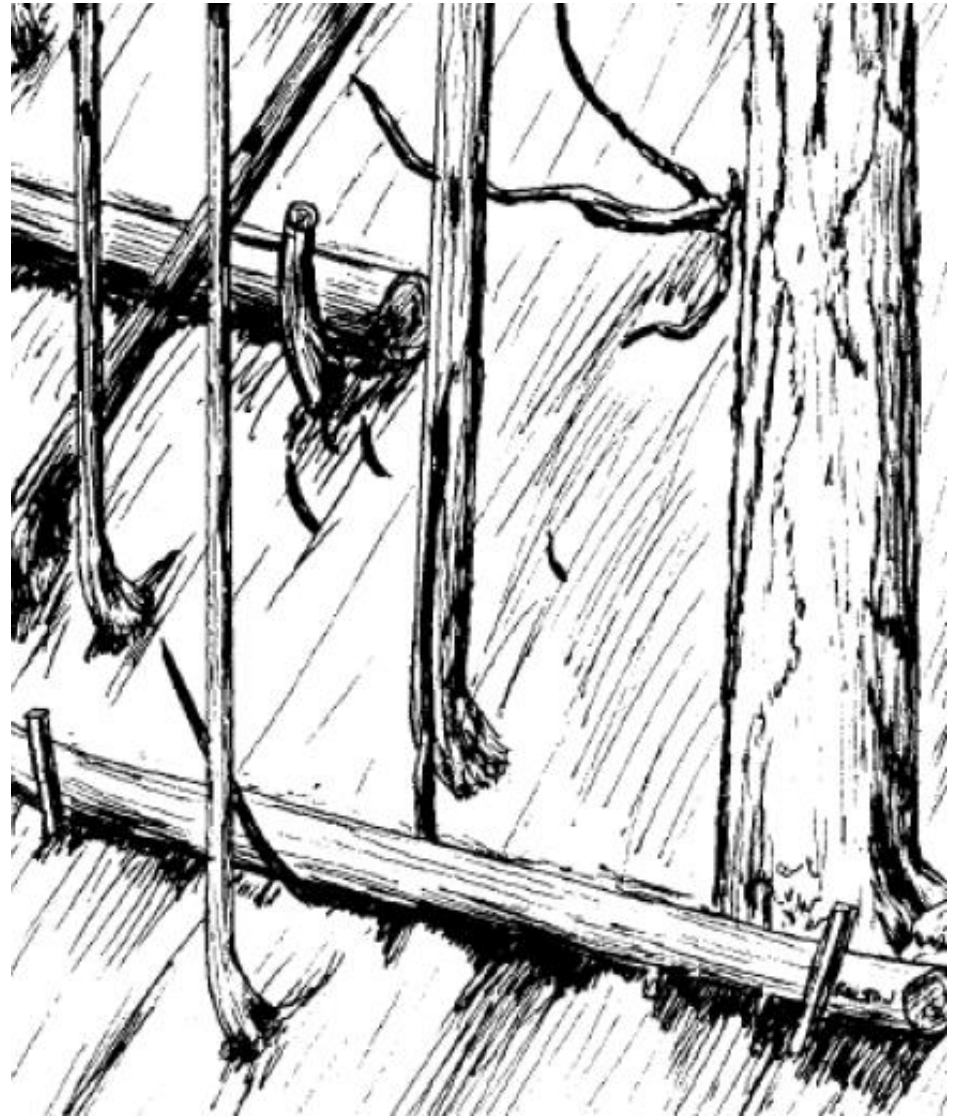


PLANO DE CONTINGÊNCIA

RESPOSTA AOS EFEITOS DOS INCÊNDIOS NA QUALIDADE DA ÁGUA
PARA ABASTECIMENTO PÚBLICO

3. Present Situation – Measures Taken

- **Contacts with official entities and NGO´s to participate in the definition and implementation of measures in order to prevent soil erosion in the burnt areas:**
 - **Creating carpets with vegetable waste;**
 - **Creating trenches;**
 - **Creating natural barriers with burnt logs.**



3. Present Situation

Preventing soil erosion in burnt areas



3. Present Situation – Measures Taken

- Facilitating communication and coordination with the **official, and unofficial, entities involved** (Portuguese Environment Agency, municipalities, regulator, universities, etc.);
- **Increase of monitoring campaigns;**
- Use of **modelling studies** for preliminary assessment of potential effects on the water quality resulting from ashes contamination;
- Increase of the routines for **monitoring water sources by visual observation;**
- Increase the **process monitoring** along the treatment system (increased frequency of testing and the number of parameters);



3. Present Situation – Measures Taken

- **Assessing the condition of facilities associated with water catchment;**
- **Anticipation of preventive maintenance operations;**
- **Provision and operation of equipment to be used in case of an emergency;**
- **Performing functional tests to equipment's less used but that will be needed in emergency situations (turbidity, ...);**
- **Increasing the reagents stocks;**
- **Strengthening the alarm system provided by remote systems;**



3. Present Situation – Measures Taken

- **Contact with the Portuguese Navy and pollution specialized companies/suppliers in order to implement measures to protect water catchments.**



***“ Difficulties
mastered are
opportunities won ”***

Winston Churchill

Thank You

Alexandra Cristóvão

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