Portuguese Water Partnership

"Water Mirrors" in Portugal

Emblematic Projects in the Water Sector

The Portuguese Water Partnership's mission is to promote an effective link between professionals, institutions and companies in order to project the knowledge and skills of the Portuguese water sector in the world, and to catalyse opportunities in international markets and in the area of cooperation within the framework of the development of robust projects in line with the Sustainable Development Goals.

Portugal has been for centuries a country open to the world

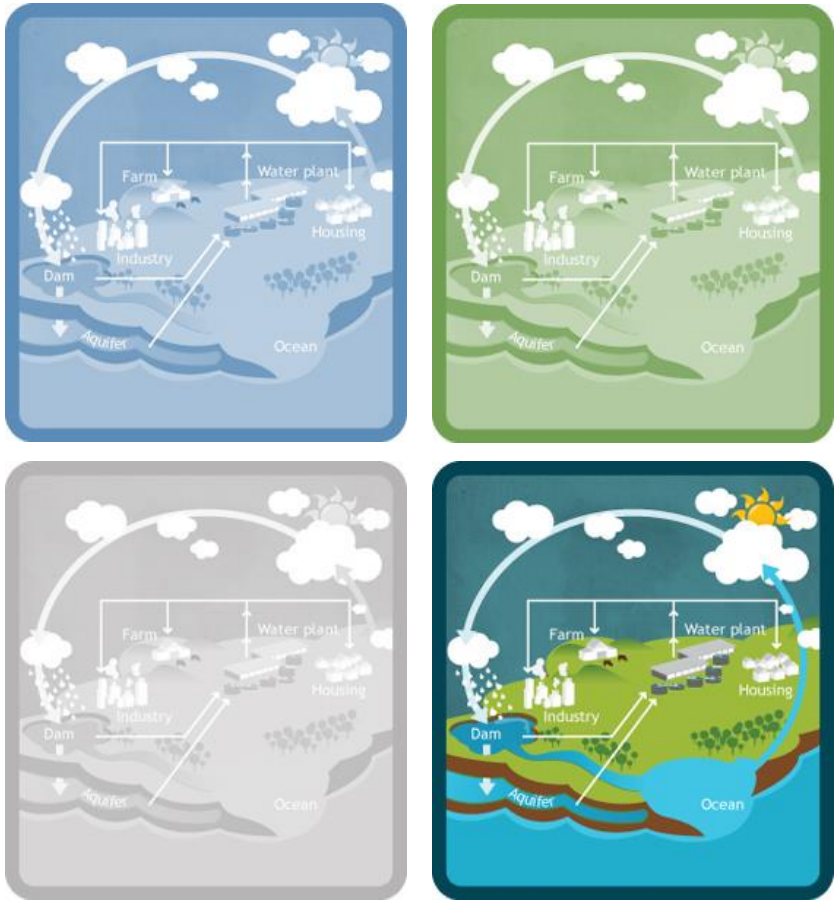
This attitude gives us a great motivation and openness for dealing with all nations and continents, regardless of their cultures and beliefs

What is needed nowadays when addressing water issues:




The same problems with approaches differently shaped throughout history

But those different approaches aim at the same result:



sustainable provision of water

for all uses,

at an affordable price,

managed by a

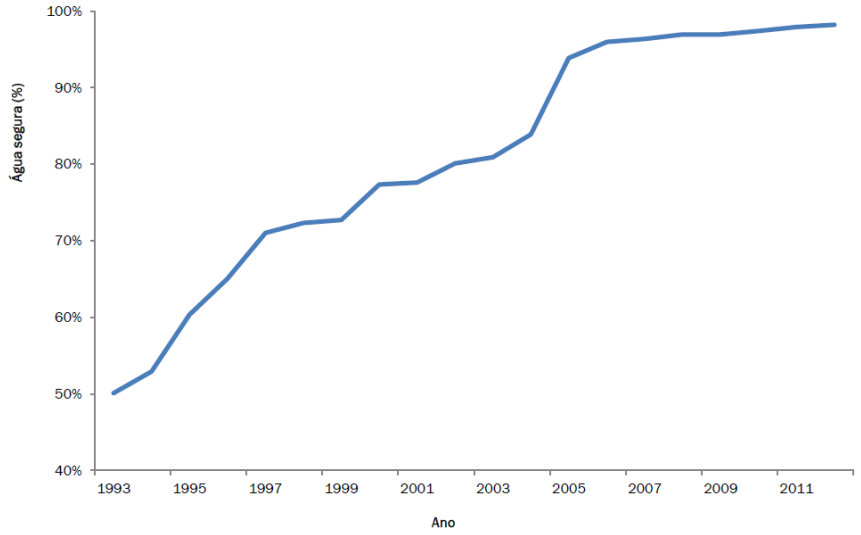
proficient governance system.

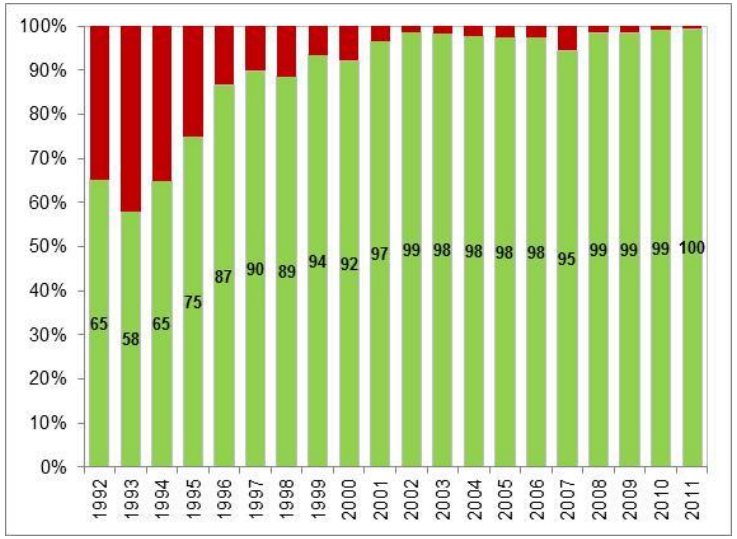
The Portuguese Water Partnership

A Portuguese contribution for a global and sustainable water development worldwide

In the last 20 years, Portuguese Water Sector has acquired and developed significant expertise in:

Water Resources | Water Services | Large Hydraulic Schemes | Coastal Management | Governance and Water Institutions





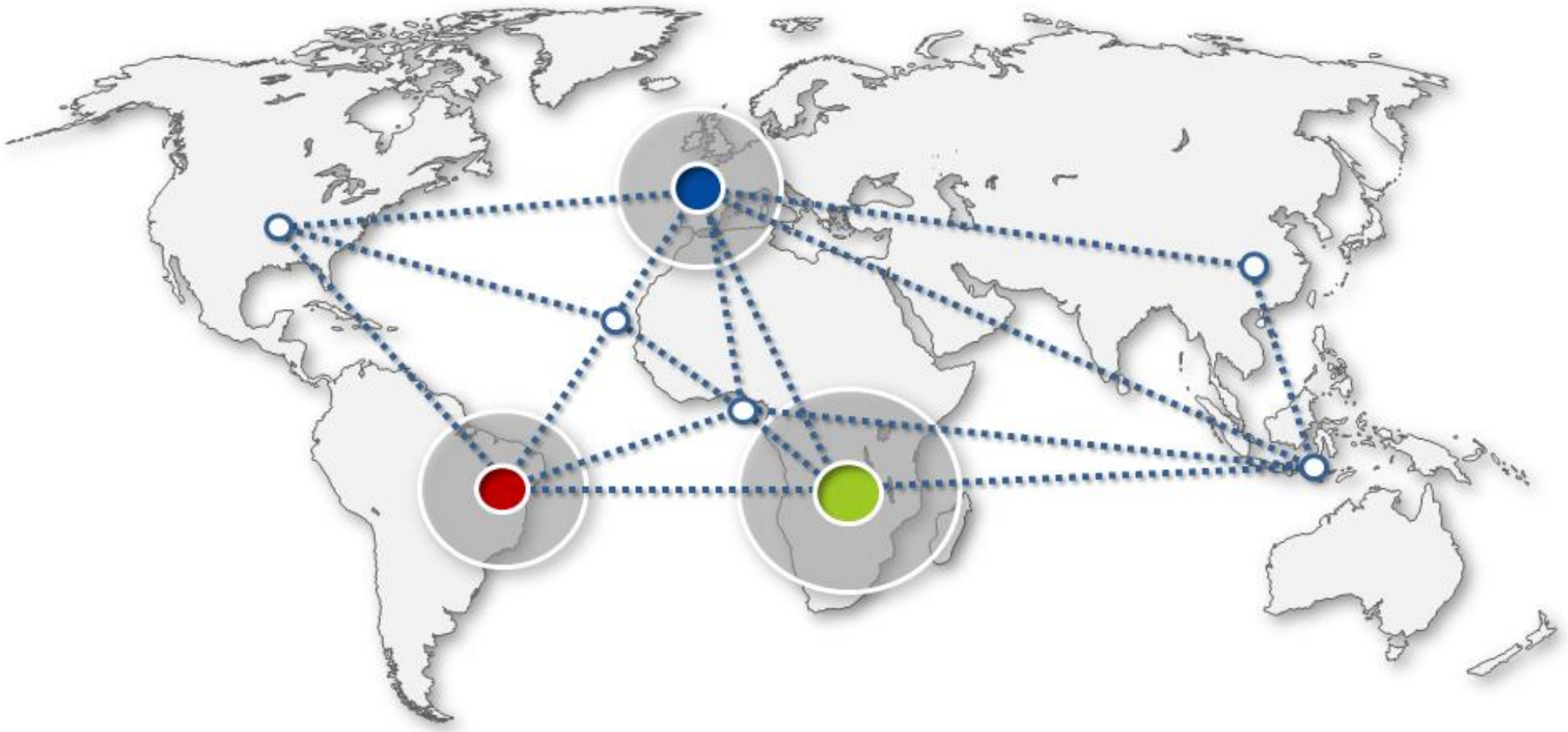
Surface water intakes	299	un			
Groundwater intakes	5735	un			
Drinking Water Treatment Pla	229	un	Wastewater treatment plants	2438	un
Pumping Stations	2372	un	Pumping stations	4350	un
Reservoirs	8391	un	Drainage systems	50400	km
Water pipes	99674	km	Outfalls	26	km

These achievement's were implemented by a solid and mature cluster of private and public institutions

dedicated to water

Several of those institutions have business or developed

close links abroad



Solutions MADE IN PORTUGAL

PORTUGUESE WATER PROJECTS AND SOLUTIONS

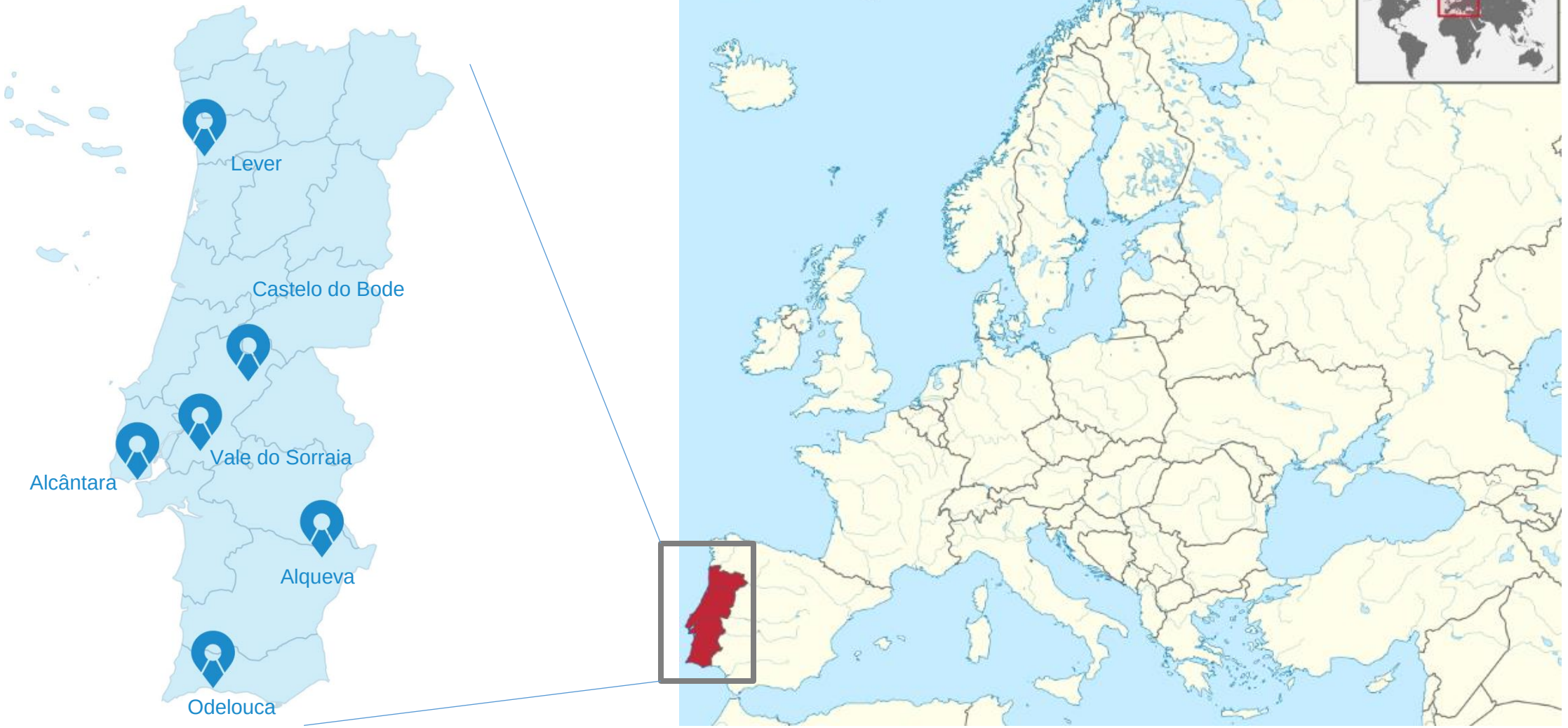
Water Mirrors in Portugal | Some Emblematic Projects

- Transboundary basins - the Albufeira Convention between Portugal and Spain
- The National Water Resource Information System (SNIRH)
- The Integrated Environmental Licensing System (SILiAmb)
- System for assessment of urban water services quality

- Multipurpose Alqueva scheme – Europe's largest artificial water surface
- Castelo de Bode complex – Water for Lisbon and Energy for the whole country
- Lever Urban Water Supply system for Portugal's second largest metropolitan area
- Alcântara wastewater treatment system – a new paradigm for WWT
- Odelouca Project – a tailor-made solution to a unique region in Portugal

- The Portuguese Miracle – the last 25 years in figures

Water Mirrors in Portugal | Some Emblematic Projects



Transboundary river basins · The Albufeira Convention

More information at:
www.cadc-albufeira.eu/pt

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Principles of the Albufeira Convention

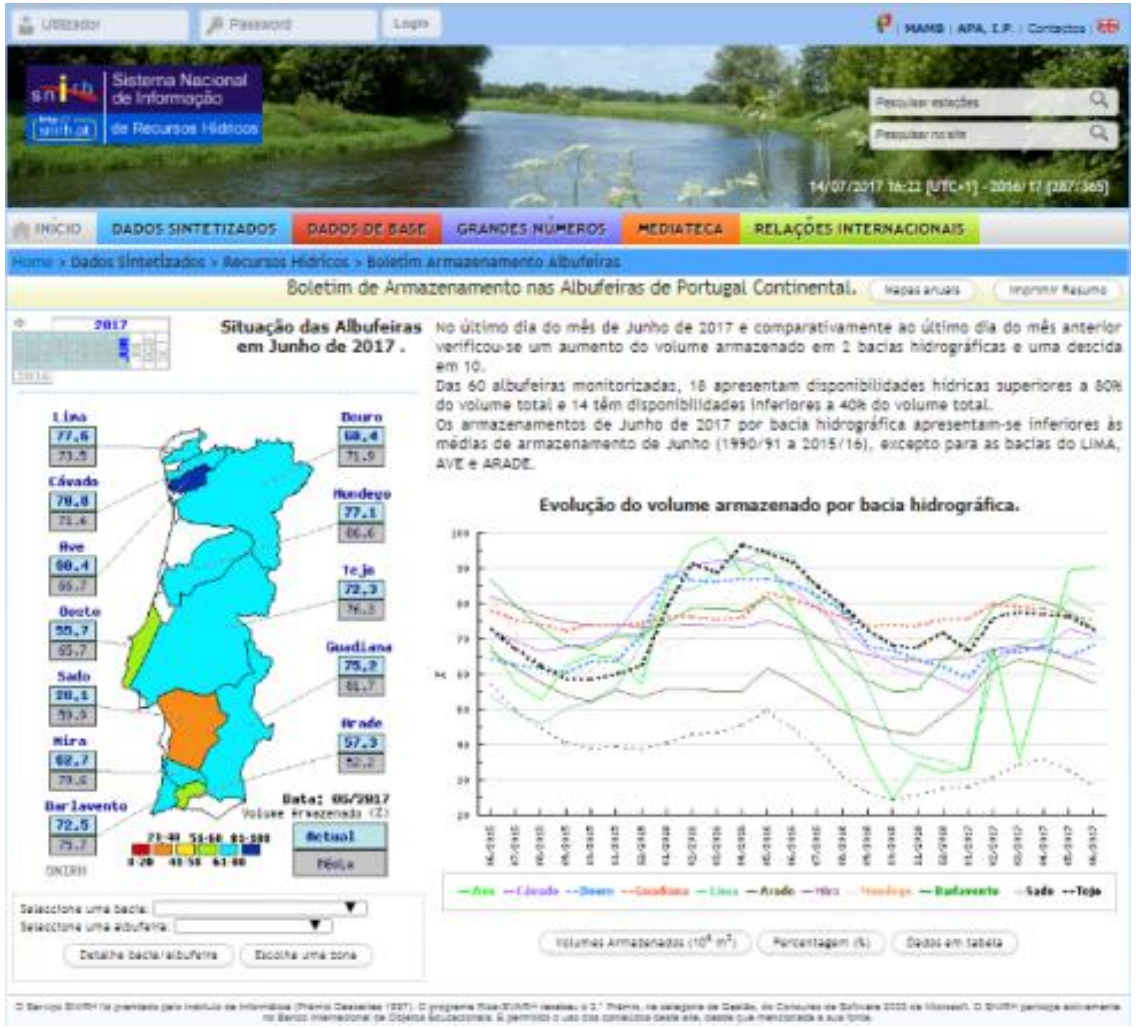
- Global perspective of **cooperation and respect** between the Parties.
- **Coordination of water planning and management** by river basin.
- **Respect and compatibility with existing situations** and those derived from agreements in effect.

In pursuance of the objectives of the Convention, **two bilateral bodies** of equal composition were established to carry out the functions of management and control of compliance with the Albufeira Convention:

- The Conference of the Parties, composed by representatives nominated by the Governments of the Parties under the presidency of a Minister from each State;
- The Commission for the Application and Development of the Convention (CADC), composed by delegations nominated by each Party.

The **compliance with the flow regime agreed under the Convention** is being ensured, and in the case of potential drought situations, Portugal and Spain implement the measures that are considered necessary to minimize their effects.

Environmental regulation by APA
The National Water Resource Information System (SNIRH)



SNIRH received in 1997 the **Descartes Prize** awarded by the Instituto de Informática.

The Rios-SVARH program received the 3rd Prize, in the Management category, from the Microsoft Software Competition in 2003.

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SNIRH integrates

A Water Resource Surveillance and Alert System (SVARH), which measures in real time the hydrological state of the country's rivers and reservoirs (water levels, flows and stored volumes), and compares the observed values with historical values in order to forecast the evolution of levels, flows and volumes stored, in the case occurrence of intense precipitation.

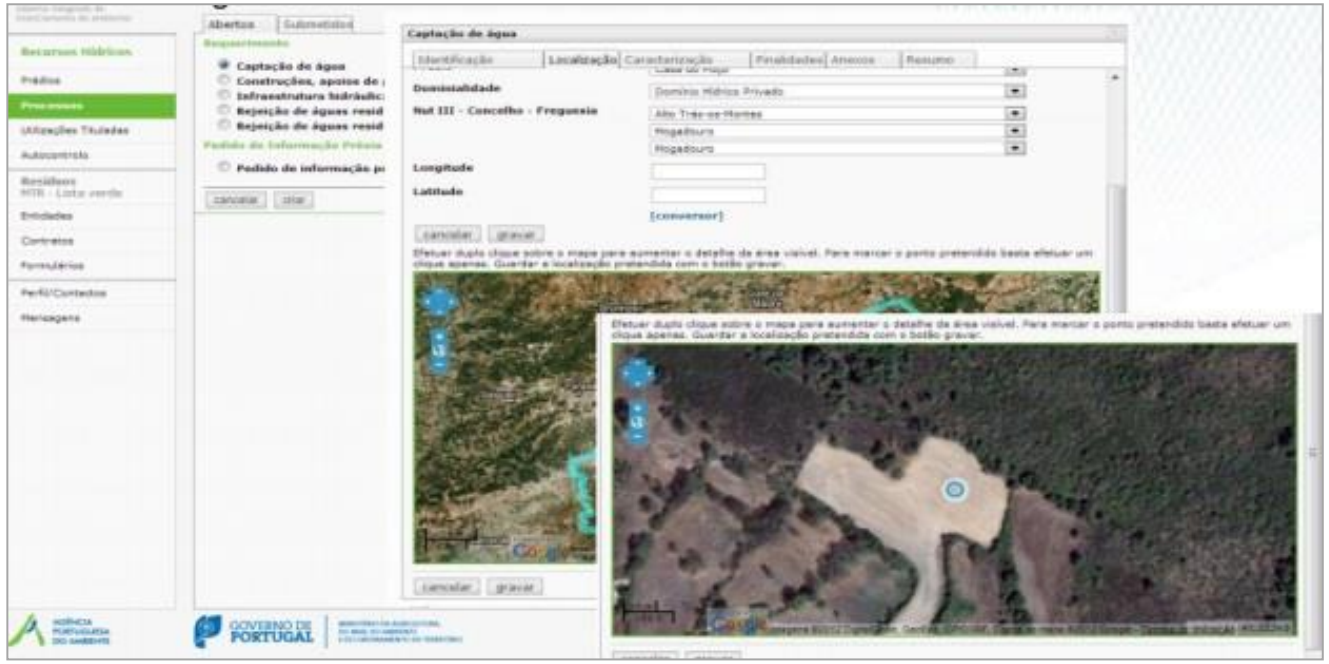
This system is intended primarily for entities with responsibilities for water resource management in the event of floods and pollution incidents, and is essential to carry out coordinated and integrated control of the volumes flowing to the different reservoirs, with flood control capacity, aiming at minimization of overflows near critical areas (urbanized, or with essential assets and strategic infrastructure).

A National Information System for Coastal Water Resources which provides data from the stations monitoring coastal water resources and other information related to coastal infrastructure, beaches, and the quality of coastal and transitional waters.

A "Junior version" of the National Water Resource Information System dedicated to the youngest.

Environmental regulation by APA · Integrated Environmental Licensing System (SILiamb)

- **making licensing requests** (including a wide range of uses of water resources allowed by law);
- **Following-up the licensing process and monitor uses;**
- communicate with the **APA and Hydrographic Region Administrations** (send and receive messages).



Advantages

- Access through the Internet, without the need of special technological resources.
- Friendly and unique interface at national level.
- Consolidated platform covering several domains (water resources, solid waste) using the same usability standards and taking into consideration the different types of users.
- Dematerialization of administratively heavy processes.
- Facilitating connections, both internally and externally.

What does it represent for the user?

- Less time to formulate the request and to receive the requested answers.
- Easier interaction with APA.
- Harmonization of procedures at national level.
- Greater transparency and coherence.

What does it represent to technicians?

- Greater ease in interaction with applicants.
- Analytical tools and systematization of the procedures to be used, which reduces the time needed for application analysis.

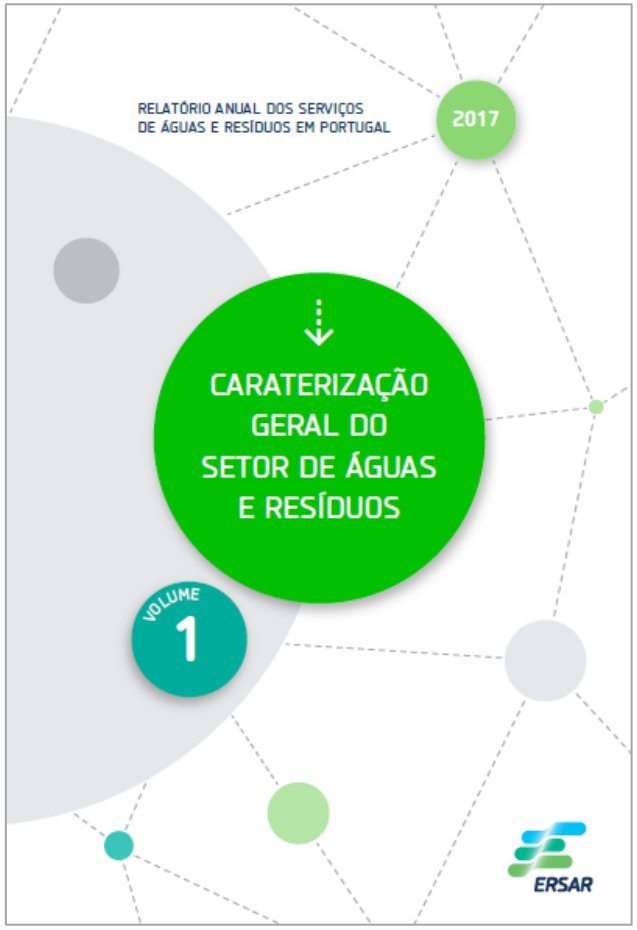
Allows the loading of data for self-control and connection with the Economic and Financial Regime.

Regulation by benchmarking . The Portuguese Regulator

Quality of urban water services assessment system

The **regulation** of quality of service aims to improve the effectiveness and efficiency with which urban water services are provided and is carried out by means of an **evaluation of the performance of the service providers**.

To this end, ERSAR – the Portuguese **Regulatory Authority for Water and Waste Services**, has implemented a system for assessing the quality of service provided by operators which comprises **14 indicators** for each of the regulated services and therefore allows **regulation by benchmarking**.



ERSAR
ENTIDADE REGULADORA DOS SERVIÇOS DE ÁGUAS E RESÍDUOS

More information at:
www.ersar.pt
https://www.oecd.org/governance/observatory-publicsector-innovation/innovations/page/ersarmobileapp.htm

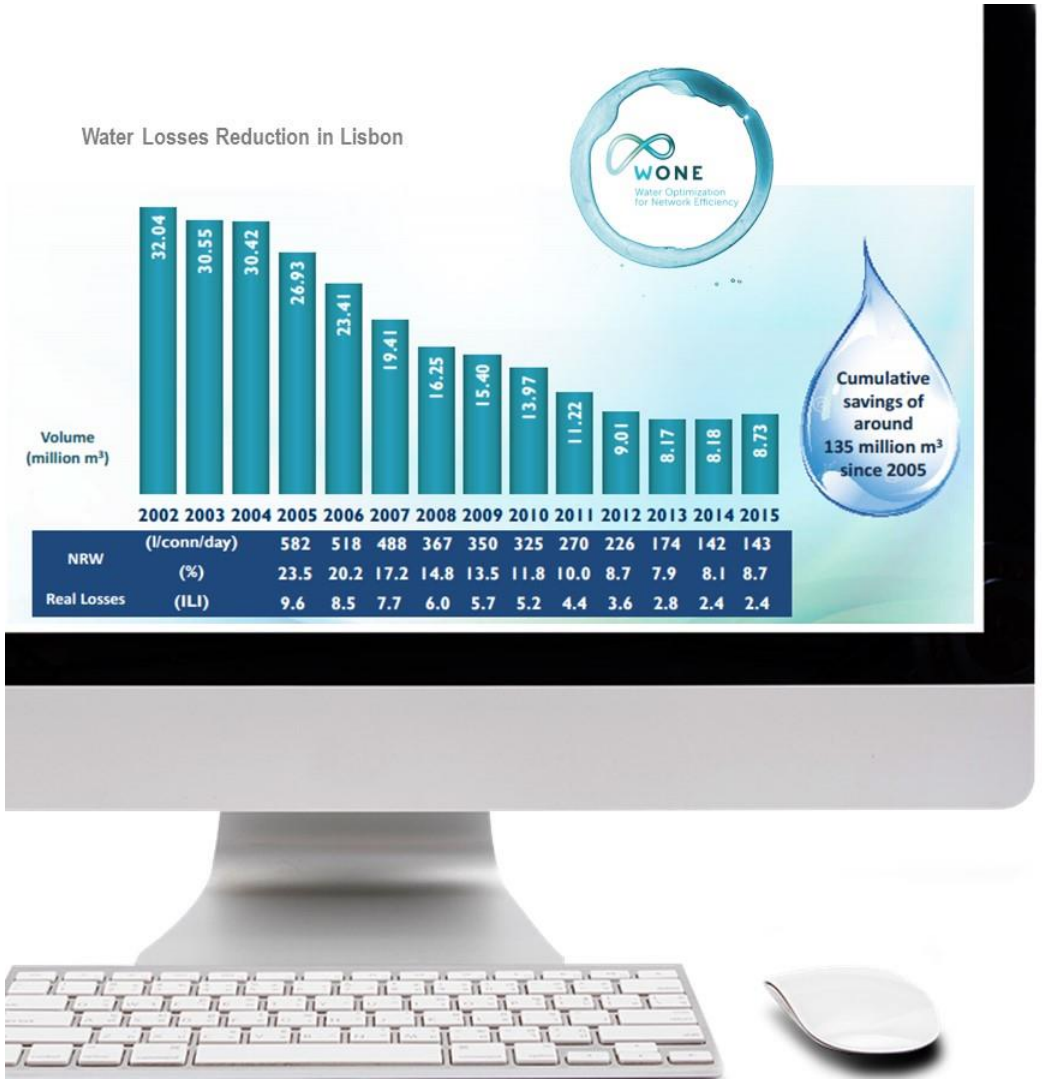
App ERSAR

Available on the App Store

Get it on Google play

Qualidade da água
Encargos tarifários
Níveis de reciclagem
Qualidade de serviço
Quem lhe presta os serviços

Management and Control of Water Losses in Urban Water Supply
Integrating Know-how and digital solutions



IT SOLUTIONS FOR EFFICIENCY & QUALITY

NON-REVENUE WATER REDUCTION IN DISTRIBUTION NETWORKS

WONE
Water Optimization for Network Efficiency

Monitoring system for **Network Management** and Water Losses Control

WONE has been proven to be **successful, adaptable and universally applicable**

WONE can **assist any utility to reduce water losses** and increase efficiency

Powered by EPAL, the **largest and oldest water utility** in Portugal

For more information please visit www.epal.pt

EPAL Grupo Águas de Portugal

The Multipurpose Alqueva Hydro-Scheme · EDIA

Alqueva is based on the concept of **multiple purposes** and **integrated management** of its strategic water reserve.

From Alqueva, there are multiple emergent paths for water usage: roads leading to the **public water supply**, with the reinforcement of 5 dams that supply about 200 thousand inhabitants; for agriculture, with an irrigated area of about 120 thousand hectares and which will be increasing to 170 thousand in the coming years; for industry; for clean energy production (540MW) and for tourism.

EDIA Empresa de Desenvolvimento e Infra-estruturas do Alqueva, S.A.

This is a project centered on the **Alqueva dam**, Europe's largest strategic water reserve with 4.150 hm^3 of capacity, from which 68 dams and reservoirs are interconnected to ensure the **availability of water**, even in periods of extreme drought, to an area of approximately **10 thousand km^2.**

The Alqueva Multipurpose Project is a **structuring project** in the south of Portugal, which has become an **anchor investment for regional development**, where up to now the lack of water had been one of the main constraints to its development, standing in the way of the **modernization of agriculture and the sustainability of public water supply**.

Alqueva has opened up unique perspectives for the **relaunch of economic and social development**, creating conditions for an **effective increase of the Regional and National Gross Domestic Product.**

More information at:
www.edia.pt

Alqueva dam

- Height – 96 m
- Total capacity – 4 150 hm^3
- Useful Capacity – 3 150 hm^3
- Water mirror – 250 km^2

Alqueva Hydroelectric Power Plant

Installed power – Alqueva I and II – 2 x 260 MW
Total: 520 MW

Pedrógão dam

(against reservoir of Alqueva)

- Height – 43 m
- Total capacity – 106 hm^3
- Useful capacity – 54 hm^3
- Water mirror – 11 km^2

Pedrógão Mini Hydropower Plant

Installed power – 10 MW

Global Irrigation System

- Area – 119 000 ha
- Primary network extension – 382 km
- Secondary network extension –1 620 km
- Dams, Reservoirs and Weirs – 69
- Pumping stations– 47
- Mini Hydropower – 5 with installed power 9,6 MW

The Castelo de Bode dam is one of the most important Portuguese dams, located on the river Zêzere, a tributary of the right bank of the river Tagus.

It is an infrastructure that supports:

- Water supply
- Hydroelectric power generation
- Flood defense
- Recreational activities

Castelo de Bode dam

- Height – 115 m
- Total capacity – 1 095 hm^3
- Useful capacity – 902.5 hm^3
- Water mirror – 32.9 km^2

Hydroelectric power generation

- Startup in 1951 and renewed in 2004
- Total installed power: 159 MW

EPAL
Grupo Águas de Portugal

edp

AGÊNCIA PORTUGUESA DO AMBIENTE

More information at:

www.epal.pt www.a-nossa-energia.edp.pt http://snirh.apambiente.pt

Water supply

In operation since 1987, the "Castelo de Bode" subsystem, designed to capture, treat and transport water for human consumption from the Castelo de Bode reservoir, is the largest water supply project in Portugal.
The water is treated at the Asseiceira Treatment Plant, a plant that annually produces more than 180 million m^3: 80% of all water produced by the EPAL system, which supplies about 3 million people in the greater Lisbon area. Asseiceira's Water Treatment Plant is one of the largest in Europe and a benchmark in the sector for its production capacity and employed technology. It comprises two independent lines: Line 1 equipped to treat up to 500 thousand m^3 / day and Line 2 with up to 125 thousand m^3 / day, with the ability to recycle all the liquid effluent resulting from the process. The innovative sludge park has allowed the reuse of sludge for the development of new products and the creation of economic and environmental value. With the ongoing implementation of the 0% Energy Project, the water treatment plant of Asseiceira will be the first self-sustainable water treatment installation.

Flood defense

Adequate management of the outflow at the Castelo de Bode dam allows, in conjunction with the management of existing facilities, namely in the Tagus basin (national and international), the mitigation of the effects of floods in the Zêzere and Tagus river basins.

Recreational activities

Numerous recreational and leisure activities are practiced at the Castelo de Bode dam, such as eco-tourism, windsurfing, sailing, rowing, as well as sport fishing.

The Water Treatment Plant of Lever is integrated in a complex located in Vila Nova de Gaia, which, in addition to the water treatment plant, includes the following infrastructure:

- Intake wells;
- Pumping stations;
- Power substations;
- Surface water abstraction facility;
- Raw water reservoir and a treated water reservoir;
- Pre-treatment unit;
- Sludge treatment plant;
- Process laboratory;
- Environmental education center;
- Operantions management building.

At Lever's Water Treatment Plant, an average of **270 thousand m^3 of water is produced per day** to supply the regions of greater Porto and part of the Vale do Sousa, covering **1,45 million people**. The water treated in this infrastructure is captured in the Crestuma-Lever reservoir (Douro river).

With the set of infrastructure that make up the Lever Complex, the **water supply is guaranteed in the necessary quantities**, through **efficient production processes that respect the highest social and environmental values and at a socially fair price**. In this way, the company contributes decisively to the **quality of life**, the **socioeconomic development** and the **environmental balance** of Greater Porto.

ÁGUAS DO DOURO E PAIVA
Grupo Águas de Portugal

More information at:
www.addp.pt

Lever's Water Treatment Plant started its operation in March 2000, using the most modern technologies in the treatment process.
In 2007, an operations management facility was built

The **architectural project**, which privileged an adequate landscape integration of the building, was the authorship of the **architect Alcino Soutinho**.

Alcântara wastewater treatment system – a new paradigm for WWT

The Alcântara subsystem is responsible for the treatment of urban wastewater produced by about 800 thousand inhabitants, serving part of the municipalities of Lisbon (western zone), Amadora and Oeiras.

The subsystem is constituted by:

- The Wastewater Treatment Plant of Alcântara;
- 11 pumping stations, located between Algés and Alfama;
- 25 km of interceptor system.

ÁGUAS DO TEJO ATLÂNTICO
Grupo Águas de Portugal

The **Wastewater Treatment Plant of Alcântara** is built under a green roof of about three hectares. This solution allows the **reduction of the landscape impact** of the existence of a large wastewater treatment plant in the middle of the city, next to a Natural Park, also benefiting from a good **thermal and acoustic isolation** and the reduction of the impermeable area to rainwater, thus contributing to flood mitigation.

This roof also lowers **global warming** as it absorbs the reflecting solar rays which would otherwise warm the atmospheric air.

The architectural project was the responsibility of architects **Manuel Aires Mateus, Frederico Valsassina and João Nunes.**

Wastewater Treatment Plant of Alcântara

Inaugurated in 1989 and extended in the decade of 2000-10, it is the largest covered wastewater treatment plant in Portugal.

General features:

- Qdim= 3,3 m^3/s (dry weather) + 3,3 m^3/s (humid weather);
- Secondary treatment;
- Disinfection by ultraviolet radiation;
- Mechanical dewatering of sludge in centrifuges for later use in agriculture;
- Deodorization system for the entire installation;
- Reuse of treated water in irrigation, in the treatment process, in the washing of streets, among other uses.

More information at:
http://www.aguasdotejoatlantico.adp.pt/

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Odelouca Project – a tailor-made solution to a unique region in Portugal

The Odelouca hydraulic project

The reservoir of the Odelouca dam has as its objective the **public supply of water** to the Algarve Region under high standards of quality and reliability.
It is the main water source of the Algarve, in articulation with a set of other surface and underground water sources.
The Odelouca Hydraulic Project is composed, in addition to the dam, by the Odelouca-Funcho tunnel and a flow control structure, as well as a set of safety and operational installations, such as the surface discharger, the bottom and **ecological flow** dischargers, and two water intake structures.

More information at:
www.aguasdoalgarve.pt

ÁGUAS DO ALGARVE
Grupo Águas de Portugal

The water stored in the reservoir is conveyed by the 8 km long Odelouca-Funcho tunnel to the Funcho-Alcantarilha pipeline, 200 meters downstream from the Funcho Dam, continuing for another 12 kilometers to the Alcantarilha water treatment plant, where it is subjected to an appropriate treatment process, so that it can then be distributed to the population.
The Odelouca dam ensures the continuous and regular supply of water for human consumption in the Algarve region, avoiding the constraints inherent to drought years.

Odelouca dam

- Height – 76 m;
- Total capacity – 157 hm^3;
- Useful capacity – 134 hm^3;
- Water mirror – 7,8 Km^2.

15% of the investment was dedicated to the environmental component and the valuation of cultural assets.
The compensation and overcompensation measures aimed at achieving the conservation objectives of the species and habitats directly affected by the project, in particular the Iberian lynx, the birds of prey (Bonelli's eagle), the endemic species of ichthyofauna and the habitats of the riverside galleries.

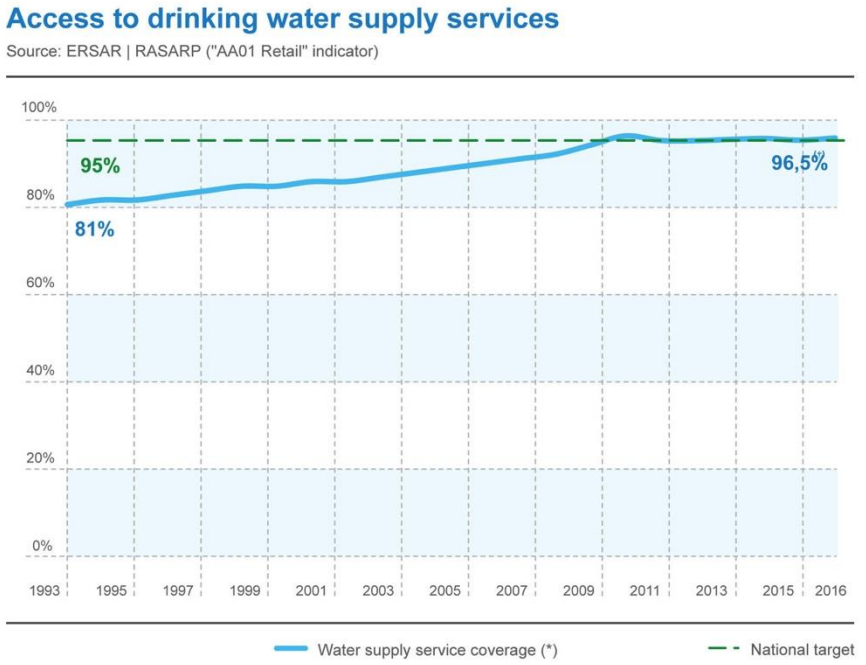
The “Portuguese Miracle”· the last 25 years in figures

In the last quarter century Portugal has witnessed a remarkable development in the field of water resources, particularly in urban water services.

It was not a miracle, but rather the result of the technical and institutional competencies that are resident in the vast group of companies and entities, public and private, that comprise the Portuguese water sector.

96,5%
of households with access to the public water supply service

95%
national goal already achieved



(*) Indicator defined as the percentage of the total number of households located in each operator's service area for whom drinking water supply infrastructure is available.
(†) Provisional data (July 2017).

The "Portuguese Miracle" · the last 25 years in figures

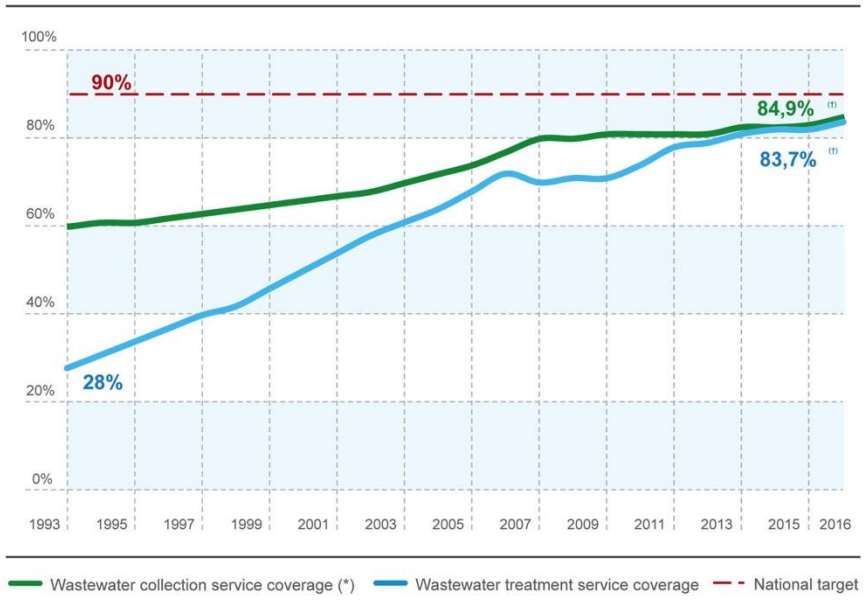
90%
national target for the coverage of collection and treatment of wastewater

84%
of households with access to public sanitation

28%
level of collection and treatment 25 years ago

Access to wastewater management services

Source: ERSAR | RASARP ("AR01 Retail" indicator)



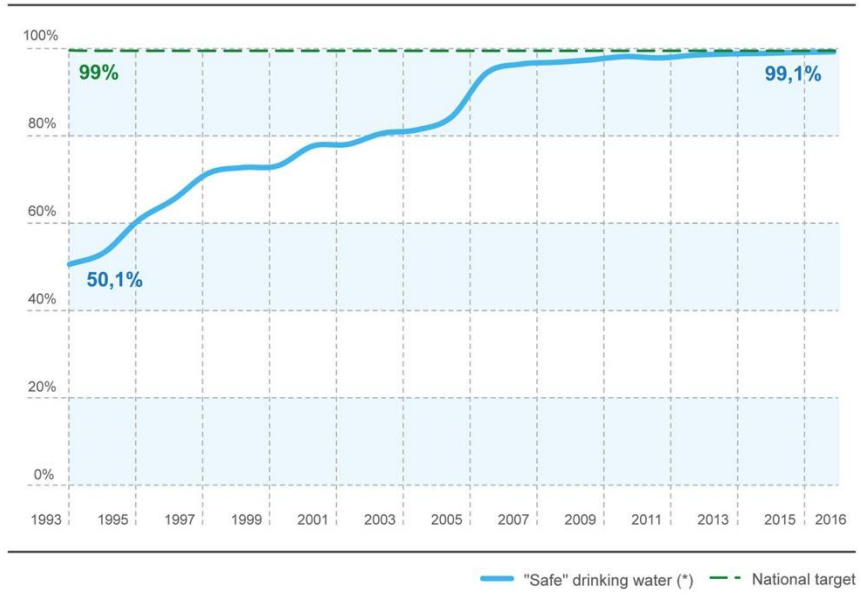
(*) Indicator defined as the percentage of the total number of households located in each operator's service area for whom wastewater collection and drainage infrastructure is available.
(†) Provisional data (July 2017).

99%
of good quality water for human consumption

50%
of water which, 25 years ago, was either not of good quality or whose quality was not known

Drinking water quality

Source: ERSAR | RASARP ("AA04 Retail" indicator)



(*) Indicator defined as the percentage of drinking water which is monitored and of good quality.

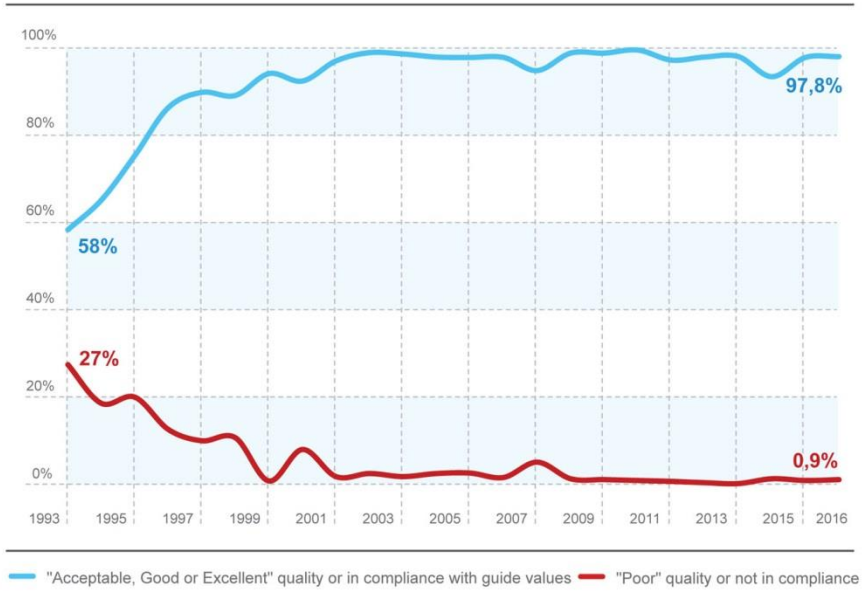
The “Portuguese Miracle”· the last 25 years in figures

98%
quality in coastal bathing waters

15%
with quality unknown 25 years ago

Costal bathing water quality

Source: APA | REA (State of the Environment Report)

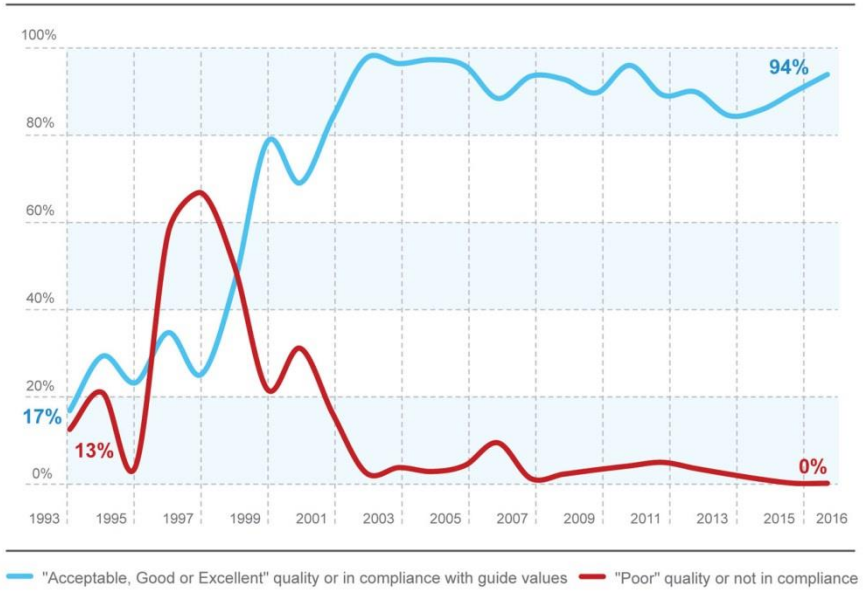


94%
of quality in inland bathing water

70%
with quality unknown 25 years ago

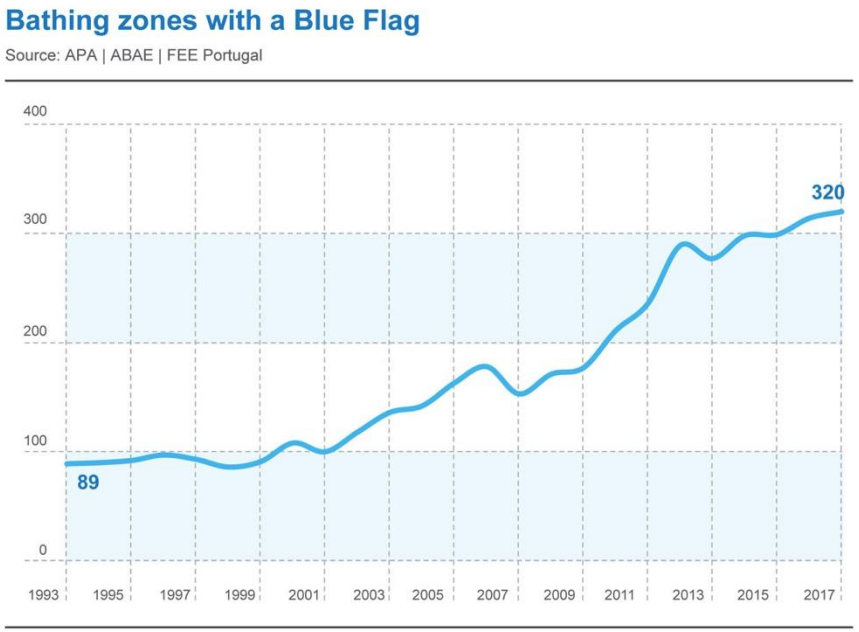
Inland bathing water quality

Source: APA | REA (State of the Environment Report)



The “Portuguese Miracle”· the last 25 years in figures

320
beaches with "Blue Flag“ status. More than 55% of Portuguese beaches



More information at:

www.ersar.pt/pt/publicacoes/relatorio-anual-do-setor

http://bandeiraazul.abae.pt

http://rea.apambiente.pt/ultima_edicao

Portuguese Water Partnership

“Whatever we possess becomes of double value when we have the opportunity of sharing it with others !”

JEAN-NICOLAS BOUILLY (1763-1842)