BE PREPARED: LISBON, PORTUGAL

Prepared enabling change

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CHALLENGES

Climate change predicted impacts potentially aggravate the existing constraints on southern European water infrastructure. In the case of Lisbon, **increased temperature**, **reduction of average annual precipitation**, **increased rainfall intensity** and **sea level rise** are expected.

WATER SUPPLY SYSTEM

Water scarcity

Reduction of the water inflows to the main water sources (Castelo do Bode reservoir and the Tagus river).

Deterioration of source water quality

Temperature increase and inflow reduction, together with potential increase in forest fires and soil erosion, contribute to the degradation of surface water quality. Aquifers may be affected by saline intrusion resulting from sea level rise, reduction of the aquifer recharges and lower surface flows.

WASTEWATER SYSTEM

Severe rainfall events

The increase in rainfall intensity and wet weather season rainfall potentially results in more flooding and a higher combined sewer overflow frequency. This affects the treatment efficiency and causes fluctuations in the pollutant concentrations in wastewater inflows to the treatment plants and thus lowers the efficiency of the treatment process.

Temperature increase

Average temperature increase augments the potential for anaerobic conditions in sewers, and the likelihood of odour and corrosion problems.

Sea water level rise

Occurrence of sea water level rise can decrease the hydraulic capacity of downstream sewers and increase salt water intrusion.

LISBON'S DEMOS

Water Cycle Safety Plan (WCSP)

The proposed WCSP framework is applied in the Alcântara catchment, which corresponds to roughly half of Lisbon's area. The purpose is to assist water utilities to manage climate change related risks covering the whole water cycle in an integrated approach. The framework is applied at integrated level (including all water components) and at system level (including single components). In the Lisbon case, two system safety plans are being tested together with the integrated safety plan for the water cycle. (Demonstration manager: Maria do Céu Almeida, mcalmeida@lnec.pt)

System for distributed real time disinfection control

A pilot test site is being setup in Lisbon supply system for distributed disinfection control via booster stations based on real-time monitoring/modeling of chlorine. This disinfection strategy aims at reducing the total disinfectant dose while keeping residuals within specified limits.

Control rules will be integrated into the real time control framework using real time modeling for selection and overall optimisation of the disinfection, based on estimates of residuals in the distribution network. (Demonstration manager: José Menaia, jmenaia@lnec.pt)

System for early warning for faecal contamination in recreational waters

Development of innovative monitoring of combined sewer overflows (CSO) and integration with a real-time monitoring and modeling platform will be tested at a pilot site located in the Lisbon wastewater system.

Pilot testing of the methodology for early warning for faecal contamination in recreational waters will be done by integrating a coupled hydrodynamic-faecal contamination model for the Algés-Alcântara section of the Tagus estuary (receiving body) with real-time CSO monitoring in the same area. The pilot system aims at providing early warnings, derived from real time data and forecasts of contamination from simulations.

Based on this methodology, wastewater utilities are better prepared to provide a faster response to manage hydrodynamic-faecal contamination related to unavoidable combined sewer overflows and uncontrolled runoff (caused by more frequent and heavier rainfall) in areas with recreational uses. (Demonstration manager: Luis David, ldavid@lnec.pt)


Alcântara Wastewater Treatment Plant, Lisbon

PARTNERS

LABORATÓRIO NACIONAL DE ENGENHARIA CIVIL

EPAL

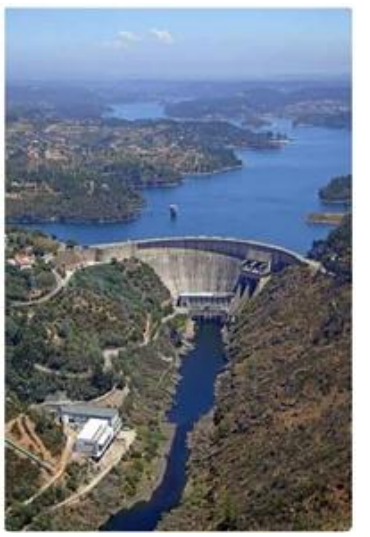
SIMTEJO Grupo Águas de Portugal

SUCCESS STORIES

Successful water loss control

Taking into account the expected effects of climate change for **EPAL**, Lisbon´s water supply system utility, has been implementing important actions for reducing the risk of shortage of water. **A consistent and systematic water loss reduction policy**, with network segmentation in DMA, along with continuous network performance monitoring and active leakage control systems, has strongly contributed to significant reduction of water losses.

Furthermore, improvements in asset management practices impacted on the reduction on the amount of non-revenue water (NRW), namely through improved maintenance and renewal programmes based on risk analysis. **In the last 10 years, the NRW at EPAL has decreased by 50%,** and in 2011 the Lisbon distribution network reached a **NRW value of 10%.**


Castelo do Bode reservoir

Improved wastewater treatment and re-using water

SIMTEJO, the wastewater system utility, has been working on the improvement of the treatment facilities during the last decade. The **upgraded Alcântara wastewater treatment plant**, an investment of €64 million, contributes to reduce the impact of climate changes as it allows the treatment of wet weather flows, thus reducing the frequency of untreated discharges to the Tagus River. Furthermore, **treated wastewater is used for non-potable uses** within the plant and for irrigation of Lisbon´s green areas and street cleaning.

SEVENTH FRAMEWORK PROGRAMME

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