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THEMATIC WORKSHOP ON NATURE BASED SOLUTIONS TOWARDS SUSTAINABLE RIVER BASIN MANAGEMENT IN UKRAINE

NbS at City Scale - The Lisbon case study, Portugal

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PRESENTATION CONTENT

- INTRODUCTION – THE CONTEXT
- LISBON DRAINAGE MASTER PLAN (2016-2030)
- LISBON WASTEWATER REUSE STRATEGIC PLAN
- FINAL REMARKS



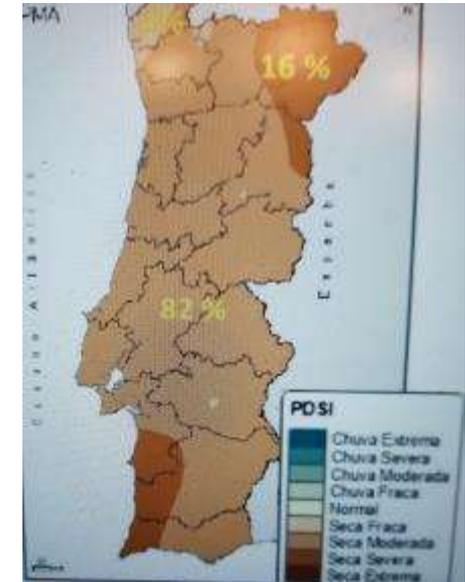
● DRAINAGE NBS (IMPLEMENTED)
■ DRAINAGE NBS (UNDERWAY)



INTRODUCTION - THE CONTEXT

Portugal – A Mediterranean Country

- 10.3 M inhabitants
- Average Annual rainfall \approx 900 mm (with regions of less than 500 mm and with a very irregular rainfall pattern, very little rainfall between May to October)
- In March 2022 practically all the country was in moderate or severe **drought** and still is. In December there were serious **floods**.
- Droughts are one of the main driving force for **water reuse** and floods for **NbS**.
- All different ... All equal!



INTRODUCTION - THE CONTEXT

Global trends and solutions

- **Nature based solutions** (e.g., constructed wetlands, retention basins, infiltration trenches, porous pavements, green roofs)
- Tential separation - wastewater from stormwater
- Decentralization and local use of resources (**reuse**)
- Relevance of services instead of infrastructures ⇒ Infrastructures should serve “the services”
- Crucial Role of **knowledge, innovation** and **intelligence** to produce Value
- Concerns with increasing **urban resilience**



INTRODUCTION - THE CONTEXT

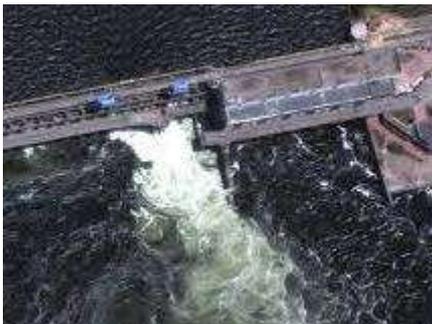
NbS for pollution control ...

- Probably more than 1/3 of the WWTP in Portugal are NbS: ponding systems, constructed wetlands, land treatment systems and hybrid solutions (in general for < 1000 inh)



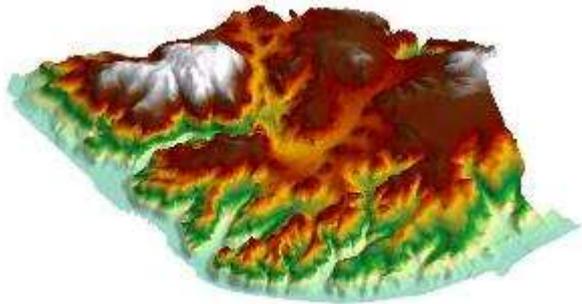
... and riversides restoration

- Destruction of Kahovka HPP dam in Ukraine - why not use NbS to control pollution and build landscapes, supporting biodiversity?



LISBON DRAINAGE MASTER PLAN 2016-2030

Main problems



**PLANO GERAL
DE DRENAGEM
DE LISBOA** 2016 - 2030



LISBON DRAINAGE MASTER PLAN 2016-2030

Approaches and solutions

- **Mitigation actions** (peak flow reduction or attenuation through storage and infiltration – **decentralized source control techniques, typically NbS**).
- **Adaptation actions** (based on increasing hydraulic capacity, new sewers, rehabilitation of assets and storage tanks) – **centralized solutions**.
 - ✓ **Physical Measures** (construction)
 - ✓ **Non Physical Measures** (knowledge acquisition, capacity building, monitoring and warning systems, awareness campaigns)



LISBON DRAINAGE MASTER PLAN 2016-2030

Different components and solutions for flood control

- Source control techniques (NbS)
- Flow control structures (NbS)
- Rehabilitation and new sewers and outlets
- Rehabilitation of overflows and inlets
- Retention basins, green infrastructure and urban farming



Lisbon retention basins and infiltration trenches



Fast increase in green infrastructure implementation after 2008 (orange areas).

LISBON WASTE WATER REUSE STRATEGIC PLAN

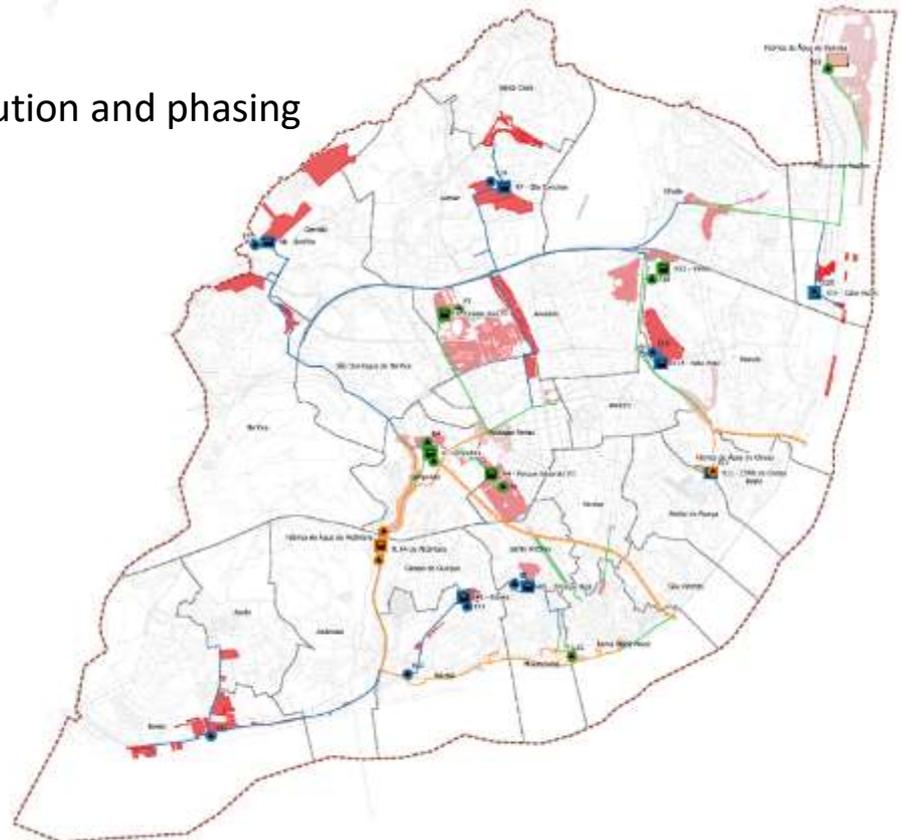
Objectives

- 100 % of the water used in city parks irrigation should be supplied with reused water (treated effluents) by 2030



Proposed solution and phasing

- Fase 1 - Infraestruturas
 - Rede
 - Estação Elevatória
 - Reservatório
- Fase 2 - Infraestruturas
 - Rede
 - Estação Elevatória
 - Reservatório
- Fase 3 - Infraestruturas
 - Rede
 - Estação Elevatória
 - Reservatórios
- Fase 1 - Área Abrangida
 - Usos Rega
- Fase 2 - Área Abrangida
 - Usos Rega
- Fase 3 - Área Abrangida
 - Usos Rega



LISBON WASTE WATER REUSE STRATEGIC PLAN

Benefits of water reuse

- Supply of **natural fertilizers**
- **Not dependent on climate uncertainty**, being an alternative source for various uses, including in context of water crisis
- "Release" water with high quality for human consumption, **reducing the pressure** on water sources/water bodies (Castelo do Bode reservoir, about 140 km far from Lisbon).
- **Economical, social and environmental benefits**



LISBON WASTE WATER REUSE STRATEGIC PLAN

Potential uses in Lisbon region

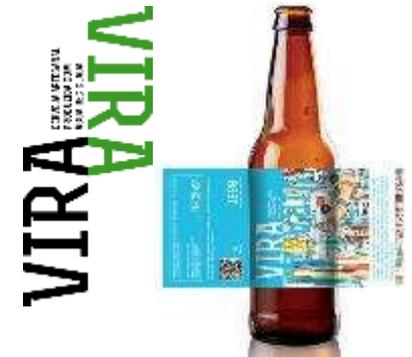
- **Irrigation** is the sector with the greatest demand for water.
- For **industry cooling purposes** (IKEA, supplied by Frielas WWTP - in operation)
- Urban uses for **street and vehicle cleaning** or fire fighting
- Recreational and environmental use in the feeding of water mirrors



FINAL REMAKS

Works in place - a valuable branding product

- VIRA is an artisanal beer created from treated wastewater (additional ozonization and reverse osmosis treatment), 100% safe.
- Come to Lisbon and drink a VIRA on the Alcantara WWTP green roof.



➤ Importance of sharing knowledge and innovation

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

JEAN-NICOLAS BOUILLY (1763-1842)



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Thank you

