Sustainable Sanitation - Lisbon Case Study

IFC Seminar - Sustainable Cities Initiative in LAC

April, 20th - 2015
AdP Internacional
AdP Internacional was created in 2001 to conduct the business management of the Águas de Portugal Group outside Portuguese territory, acting as showcase for the skills and capacity of the Group.
AdP Internacional search the development of **strategic partnerships** with the **main players** in the **water and sanitation sectors**.
AdP Internacional develops its activity to ensure the effective **training** and **transfer of know-how** to local human resources, through:

**Water Supply**

**Wastewater Sanitation**

**Treatment and Recovery of MSW**
AdP presence in Latin America:


- Due diligence to acquire water utility companies in Argentina (Buenos Aires and Missiones Provinces) and Chile (Concepción, Santiago and Valparaíso Provinces).

- FUTURE Projects: Expression of Interest to provide Consultancy Services, Community Development and Institutional Strengthening for the “Water Supply and Sanitation Program” in Guadalquivir, Bolivia.
Portugal

- Preparation of master plans for 193 municipalities, including the conception of technical solutions and the respective investment plans;
- Innovative tools to reduce AdP Group’s ecological footprint keeping a high service standard.

International Capacity

- Technical Assistance;
- Operation and Management;
- Capacity Building/ Training.
Sustainable Sanitation
Lisbon Case Study
In the 80’s our Capital City had big sanitation problems...

In 20 years we respond to all needs with efficiency and innovation.
Lisbon Sanitation
The Challenge and the Result!

PROBLEM AND IMPACT

Governance Model

Information

Intelligence
Big data/Efficiency

Infrastructure

CLIMATE CHANGE
Tejo Estuary and Trancão River Depollution
Case Study – Trancão, most polluted river in Europe in the 90’s

- Region with several ecological disasters in the twentieth century.
- Intensive Industrial Zone polluting.
- The solutions found until 1990 were not adequate and did not respond to the region's growth.
- The Ecosystem suffered a environmental degradation that dominated the Lisbon Metropolitan Area.
- Separate, partial, **combined** sewers: > **100 CSO structures** and 74 pumping stations
- Risk of **flooding** at sewers, pumping stations and WWTP (rain and high tide combined)
- Wet weather flow > **10 x Dry weather flow** up to **25 x dilutions**
- Functional failure of network during storm events (5 hours to stabilize operation)
Benfica’s Stadium – Hail
29-4-2011

Sacavém, Northeast Lisboa
30-09-2007

CSO
Ocean and river tide influence
- West Lisbon downtown Alcântara system
- 756,000 hab.eq in 37km²
- WWTP Q dry weather: 3.3 m³/s
- WWTP Q wet weather: 6.6 m³/s
- 40 CSO and 13 pumping stations

Lisbon downtown (Av. Liberdade)
29-10-2010

Lisbon Sanitation
CLIMATE CHANGE (2001-2015)
Lisbon Sanitation
The Challenge and the Result!

Governance Model
REGIONAL IMPACT:

- Area with high population density and major tourist attraction;
- Increasing stresses: financial, environmental, legislative, social and infrastructural
- High investment's were need for upgrade and new infra-structure

GOVERNANCE MODEL:
To resolve the local needs and the necessary economical scale, maximizing the existing resources (financial and technical).

PORTUGUESE SOLUTION:
Multimunicipal Systems manage by Águas de Portugal
Lisbon Sanitation
INFRASTRUCTURE

PROBLEM AND IMPACT

CLIMATE CHANGE

Infrastructure
Objective: Collection and treatment of all wastewater in all the metropolitan region;

Sustained intervention, without service interruption, using the most advanced techniques available;

Incorporation of secular infrastructure of a modern collection and treatment systems.
Lisbon Sanitation INFRASTRUCTURE

2002-2013

CAPEX 350 M€
(72 M€ EC)

- 29 WWTP
- 294 km Interceptors
- 80 pumping stations

Serve: 1.500.000 inhabitants-equivalent
Lisbon Sanitation
INFRASTRUCTURE

Tejo Estuary and Trancão River Depollution
Case Study – Reinventing “Tereiro do Paço” The Historical Heart of Lisbon

- 8 tide valves "duckbill" DN 1800
- 8 tide valves rectangular section 1000x1800
- Second flow control valves and DN500 DN1000
- Discharge door
- Interceptor wastewater DN1200
Recovery and improving existing infrastructures:
The Alcantara WWTP (6,6 m³/s) international success!

Before: ...and after!
Lisbon Sanitation Information

PROBLEM AND IMPACT

CLIMATE CHANGE
Too much information (data and model´s)

- Models, SCADA´s, automation, data warehouse, historians, isolated sensors, external information services
- Lot of data in a wide range of formats with a confusing mix of unrelated contexts
- Sewer flow measurement for operation and billing
- Daily sampling in WWTP
- Spectrofotometric and quality probes in WWTP (2 min sample)
- Monitoring and model of Tagus Estuary (hidrodinamic and quality: MOHID)
- Social network data
More, and more pressure…
“The Challenge”: Improving operation

- Easy access information for different copyright SCADA and other database source
- Wastewater utilities need decision support tools based complex mathematical models, tuned for local specific conditions, sustain in solid information data inputs.
The Challenge and the Result
Lisbon Sanitation
Lisbon Sanitation INOVATION – Smart Efficiency

Wet weather
Smart operation (data + model’s)

Be Inspired Awards Finalist (2012)
Honour Award IWA Global Project Innovation Awards (2012)

Predictive flood warning

Predictive CSO impacts
Lisboa downtown: Combined sewer flow measurement
3D Lisbon Downtown flood modelling
SIMT_90 SMART OPERATION

Real case example:

- Emergency stoppage intervention in the Agências Pumping Station.
- What is the most suitable timing for the intervention?
SmartWater4Energy (R&D Project)

Operational CFD design for energy reduction
SimT_Aqua: ALERTS AND SMART REPORTING

Energy KPI

Average and maximum velocity and wind direction frequency:
- Frequency (%)
- Average velocity (km/h)
- Maximum velocity (km/h)
- % of time without wind: 3%

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Dolphins returned to swim in Tejo river

The Ecosystem, the City, the People ... All are now living the Tejo River and Trancão! ... Even the dolphins returned here!
Lisbon Sanitation Success Story

Enjoy!!!
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April, 20\textsuperscript{th} - 2015

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