

**Sustainable Water
Integrated Management (SWIM) -
Support Mechanism**



Project funded by
the European Union

Water is too precious to waste

TWO DAYS TRAINING ON THE OPERATION AND MANAGEMENT OF WWTPS

9-10 September, Murcia

Overview of Management and Financing Models

Presented by: Dr. David Martinez Vicente

La contaminación del Segura es diez veces superior a la permitida por la ley

La Confederación Hidrográfica reclama al ministro un drástico aumento del caudal

La Confederación Hidrográfica del Segura ha presentado un informe al ministro de Medio Ambiente en el que denuncia que la contaminación del río Segura es diez veces superior a la permitida por la ley.



Segura Basin urges Ministry to carry out dredging of the river
Contamination in the Segura River ten times the legal limit

Nuevas protestas contra el deterioro del río

Los habitantes de los municipios de la cuenca del Segura han organizado una serie de manifestaciones para exigir al Gobierno que tome medidas urgentes para mejorar la calidad del agua del río Segura.

1998

COMUNIDAD AUTÓNOMA

La Confederación investiga la muerte de peces y apunta como posible causa un vertido



La Confederación Hidrográfica del Segura ha iniciado una investigación para determinar la causa de la muerte de peces que se ha producido en el río Segura.

Technicians analyze water at the mouth of the River Segura
Segura Basin Authority investigates death of fish and points to discharge as root cause

1998

COMUNIDAD AUTÓNOMA

INCIDENTALES PRO BAO LIMPIO

A medida de 22.000 personas en Murcia en protesta por la contaminación del Segura y para exigir un plan de limpieza.



Doce mil personas daman en las calles de Murcia por el saneamiento del Segura

Las Elecciones Autonómicas el domingo de Murcia se celebraron en un ambiente de protesta por la contaminación del Segura.



La lucha por el Segura llega a Madrid

Una gran manifestación de protesta en el Congreso por el agua del Segura.



Annual twelve thousand people demonstrate in front of the Congress demanding urgent need for river sanitation
Fight for Segura River reaches Madrid

1999

La verdad



Mucho que oler. Cada día hay que traer mayor florero de voluntad para acercarse al río Segura, especialmente desde Murcia hasta la Vega Baja, olores insostenibles cerca del cauce.

It stinks

1982

Civil platform urges President of the Segura River Basin Authority to stop discharges
12000 people come out on the streets and demand a clean Segura River



12.000 personas daman en las calles por un río Segura limpio

La Plataforma Ciudadana en el Congreso de la Confederación para exigir un plan de limpieza del Segura.

1998

1998

Signitors call for "urgent action" against contamination
Thousands of people demonstrate against discharges into the Segura River

2002



Miles de personas se manifiestan contra los vertidos del río Segura

Overview of Management and Financing Models

Before 1998

Equivalent Population according European Directive

CUADRO 1

Población equivalente servida conforme a la Directiva 91/271

Comunidad Autónoma	Conforme		No conforme en construcción		Unsuitable treatment No conforme (h-e)		Total (h-e)	Coste unitario — (pta/he)
	(h-e)	Porcentaje	(h-e)	Porcentaje	(h-e)	Porcentaje		
Andalucía	4.787.733	34,96	2.049.935	14,97	6.856.717	50,07	13.694.385	38.960
Aragón	1.037.000	40,76	—	—	1.507.000	59,24	2.544.000	39.429
Asturias	736.311	34,70	120.000	5,66	1.265.494	59,64	2.121.805	61.084
Baleares	969.848	51,05	211.252	11,12	718.834	37,83	1.899.935	35.211
Canarias	2.002.075	61,48	175.000	5,37	1.079.548	33,15	3.256.624	38.286
Cantabria	25.000	1,87	10.000	0,75	1.305.000	97,39	1.340.000	45.506
Castilla y León	783.666	13,19	755.255	12,71	4.402.072	74,10	5.940.993	36.182
Castilla-La Mancha	1.599.600	49,58	70.000	2,17	1.556.765	48,25	3.226.366	26.556
Cataluña	5.601.135	38,77	5.849.692	40,49	2.997.491	20,75	14.448.319	31.082
Extremadura	606.854	30,91	85.000	4,33	1.271.470	64,76	1.963.324	51.211
Galicia	365.732	6,67	224.500	4,09	4.896.982	89,24	5.487.214	31.986
Madrid	10.225.814	83,47	129.300	1,06	1.895.570	15,17	12.250.685	45.441
Murcia	700.000	23,73	108.000	3,66	2.142.000	72,61	2.950.000	23.778
Navarra	75.657	8,83	10.900	1,27	770.568	99,00	857.125	21.626
País Vasco	559.000	16,72	68.000	2,03	2.716.490	81,25	3.343.490	49.475
La Rioja	125.777	22,83	—	—	425.229	77,17	551.006	27.042
Comunidad Valenciana	4.364.318	48,71	1.147.000	12,80	3.449.287	38,49	8.960.606	34.330
Ceuta y Melilla	—	—	—	—	266.912	100,00	266.912	18.928
España	34.565.520	40,62	11.013.834	12,94	39.523.429	46,44	85.102.790	36.493

72,61 % population without sufficient wastewater treatment

El río se pone el traje de domingo

La sostenibilidad del Segura llega a valores más insuperables en todas sus vertientes

La Guantería Fluvial ha alcanzado este año 750.000 kilómetros cuadrados de cuenca, como si fueran veinte vertientes al mismo tiempo.

Evolución de la contaminación orgánica



El Segura, un cauce limpio de principio a fin

La Confederación Hidrográfica costata que, desde el año pasado, la contaminación es imperceptible en todo el recorrido del río.



Pollution in the river has dropped to imperceptible levels over its whole length. Segura River dressed in Sunday best.

Report on water quality carried out by the Segura River Basin Authority shows that organic contamination is imperceptible, being consistent at the headwaters. Segura River gets 'A' grade.

Segura River Basin Authority states that since last year contamination is "imperceptible" over the whole length of the river. Segura River: clean from beginning to end.

Organic contamination has almost disappeared and is below 2 mg per litre thanks to treatment plants, and plan against pesticides discharge. River is now 50 times cleaner than 20 years ago.

10 REGION |

Perfil de demanda biológica de oxígeno en el río Segura



El río baja 50 veces más limpio que hace 20 años

La contaminación orgánica que ha desaparecido y no llega a dos miligramos por litro gracias a las depuradoras y sin vertidos.

El Tratamiento del Tajo sigue siendo imprescindible para la cuenca.

Sobresaliente para el Segura

El informe sobre la calidad del agua realizado por la Confederación Hidrográfica costata que la contaminación orgánica del río es "imperceptible", llegando a ser "imponente" en la cabecera.



La contaminación orgánica de cada tramo del Segura es imperceptible

Un estudio lo atestigua fehacientemente en el mantenimiento del caudal.



Research gives 'A' grade to river basin authorities. Organic contamination imperceptible in each stretch of Segura River.

Promocionan Murcia como sede del turismo de congresos

El Ayuntamiento de Murcia presenta un estudio que muestra que la ciudad es una excelente opción para albergar congresos.

MURCIA

Las nutrias vuelven del 'exilio'

El Segura recupera, tras 15 años de ausencia, a las nutrias, especie protegida que había sido exterminada.



Species absent for many years are now back in Segura River, even in the vicinity of the urban stretch. Otters come back from 'exile'. ANSE and the Council for Environment present a report showing that life is coming back to the river.

Región de Murcia



La CHS admite que el río Segura es de los más limpios de España

Un informe revela que la contaminación orgánica es imperceptible.

Study shows that organic contamination is imperceptible. Segura River Basin Authority states that Segura River ranks amongst the cleanest in Spain.

2010

Overview of Management and Financing Models

It was necessary :

Funding for new collectors and wastewater treatment plants

Overall investment in wastewater facilities : 645 Million €

European Union has cofunded 75 % by means of European Regional Developing Fund (ERDF) and Cohesion Fund

A new management model

Overview of Management and Financing Models

Other possibility for funding public infrastructure : **PPP**

PPP (Public-private partnership) : A contractual arrangement between the public sector and a private entity aimed at financing, designing, operating and maintaining public sector facilities and services.

Consisting on two core elements : Project finance and long term contracts

Overview of Management and Financing Models

Advantages for PPP

- Make the good or service available
- Accelerated delivery
- Reduces public capital investment (reduces public borrowing) ?
- Whole life costing (a balance between construction and maintenance costs)
- Construction period : No payment
- Pay for performance and output (improved service coverage)
- Theoretically better efficiency
- Increase economic activity

Overview of Management and Financing Models

Disadvantages for PPP

- Private sector has higher cost of finance (according to the risk)
- Loss of management control by the public sector
- Long term relatively inflexible structures and no controlled risks. It can appear big differences between projected and final incomes
- Potential for negative public reaction to profit and control

Overview of Management and Financing Models

Factors influencing PPP model success :

- Strong institutional framework
- Win-win situation for all stakeholders
- Cost and Risk sharing arrangement
- Robust monitoring system
- Clear risk allocation

Overview of Management and Financing Models

Successful water PPPs :

Bucharest : Water and Sanitation

Veolia won the bid to operate and maintain the water and sanitation system for 25 years

- Appr. €70 million investment into modernizing water and sanitation services between 2002 and 2006
- Built a new water treatment plant
- Reduced water losses (the loss was reduced by 44,4 %)

Overview of Management and Financing Models

Successful water PPPs :

Manila Water

- Non-revenue water was reduced from 63 % in 1997 to just 12,5% at present
- Without taxpayer money being spent for new water resources, the amount of water delivered to customers grew threefold from 440 million liters per day to 1.140 million
- Served customers from 3 million to 6 million, who get 24-hour service, from just 30 % before privatization
- The cost of piped water from P 150-200 per cubic meter to P 75 per month

Overview of Management and Financing Models

Successful water PPPs :

Atotonilco WWTP

- Biggest WWTP in the world
- Capacity : 3.024.000 m³/d
- Population equivalent : 10,5 million people
- Investment : USD 700 million
- 25 years O & M



Atotonilco, Mexico

Overview of Management and Financing Models

Sea Water Desalination Plant Fouka (Algeria)

- Capacity : 120.000 m³/d
- Population : 800.000 people
- 25 years O & M



Overview of Management and Financing Models

Aragon Region Wastewater Treatment Plan

- 132 WWTP in 13 groups
- Population : 200.191 people (15,8 % Aragon)
- Global investment : € 297 million
- Global O & M in 20 years : € 442 million
- Planned operation year: 2006

Actually only 60 % WWTPs have been built

Overview of Management and Financing Models

Sea Water Desalination Plant Escombreras

- Capacity : 63.000 m³/d
- Investment : € 145 millions
- O & M : 25 years
- According to the contract, it will be paid globally € 580 millions
- **This plant isn't sustainable**



Overview of Management and Financing Models

CONCLUSION :

PPPs Not Easy, but...

- Can be a valuable option

Sometimes, the only way it can be done

Overview of Management and Financing Models

Management Model in Murcia Region

Changes in Sanitation Law :

- **Assigning wider competence to the Regional Government**
- **Approving Master Plan for Urban Wastewater Sanitation**
- **Implementing a “ Wastewater Reclamation Tax “**
- **Creating a Public Entity responsible for the monitoring, operation and maintenance of facilities**

Overview of Management and Financing Models

Objectives of the Master Plan:

- **Environmental restoration of the Segura River**
- **Increasing water availability through reclamation**
- **Complying with the European Directive on Urban Wastewater Treatment**
- **Protecting Mar Menor Coastal Lagoon and Mediterranean coastal waters**
- **Valorize all generated organic waste**

Overview of Management and Financing Models

The plan was designed in 2001, coming into force for a period of 10 years

The plan had to solve the following aspects :

- To establish the facilities required for sanitation and wastewater treatment in the Murcia Region
- To select the set of design criteria which ensure the reliability and high quality of treated water

Overview of Management and Financing Models

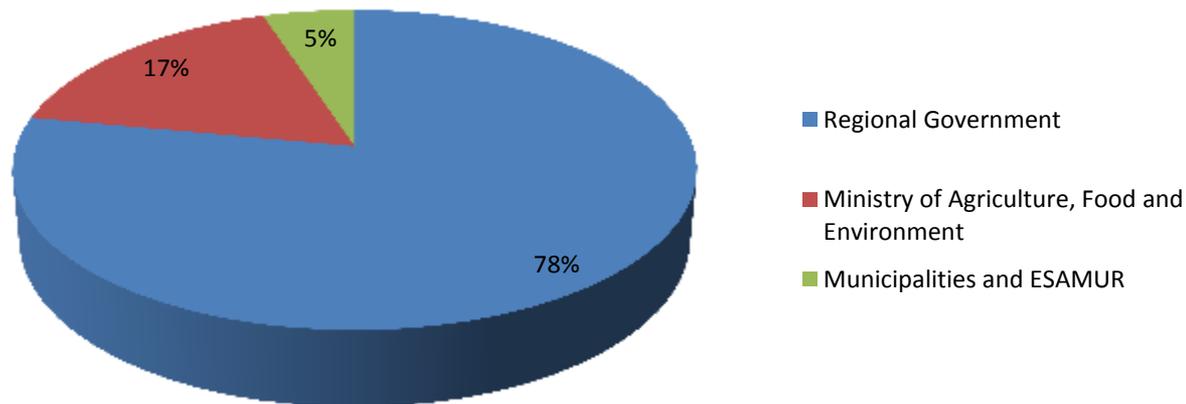
GUIDELINES OF THE MASTER PLAN :

- Highly recommend centralized system
- For secondary treatment, the usual system is the biological treatment with activated sludge (Conventional Activated Sludge System, Extended Aeration or Double-Stage according to the plant size and influent characteristics)
- More stringent treatments for nutrient removal
- Tertiary treatments aimed at enabling the reuse of water

Overview of Management and Financing Models

Overall investment in hydraulic works : € 645,8 millions

Investment by Administrations



Overview of Management and Financing Models

But evidence shows it's not enough

We have to guarantee that the maintenance and operation will be feasible

It was created a tax called “ canon de saneamiento “

Overview of Management and Financing Models

Main characteristics of this tax :

- Principle of solidarity : The tax is the same for all municipalities
- Tax is only paid if you're connected to the sewage
- Tax is composed of two parts, a fixed and a variable fee
- There's a rate for domestic discharges and a different one for industrial discharges. For industries are applied the " polluter pays " principle.

Overview of Management and Financing Models

Weighting coefficient for industrial discharges :

$$C_c = \left(1. \frac{SS}{300} + 2. \frac{COD}{333} + 1,3. \frac{NTK}{50} + 2,6. \frac{P_T}{14} + 3. \frac{SOL}{2000} \right) \frac{1}{9,9}$$

Where: SS: Suspended solids in mg/l.

COD: Chemical Oxygen demand in mg/l.

NTK: Total Kjeldahl nitrogen in mg/l.

P_T: Total phosphorus in mg/l.

SOL: Conductivity in µs/cm

Overview of Management and Financing Models

- ESAMUR is in charge of collection of this tax
- Payment is collected by water supply bill through water supply companies, except for private water supplies that is collected directly by ESAMUR
- The tariff is approved by Regional Government every year

Tariff 2013 :

	Fixed rate (€/supply/year)	Variable rate (€/ m3)
Domestic use	33	0,28
Industrial use	35	0,38

مع خالص شكري
وامتناني

Thank you
for your attention

Merci pour
votre attention



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