Smallwat11
3rd INTERNATIONAL CONGRESS
WASTEWATER IN SMALL COMMUNITIES
TOWARDS THE WATER FRAMEWORK DIRECTIVE (WFD)
AND THE MILLENNIUM DEVELOPMENT GOALS (MDG)

CURRENT SITUATION OF SANITATION AND WASTEWATER TREATMENT IN SMALL SPANISH AGGLOMERATIONS

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2. Methodology
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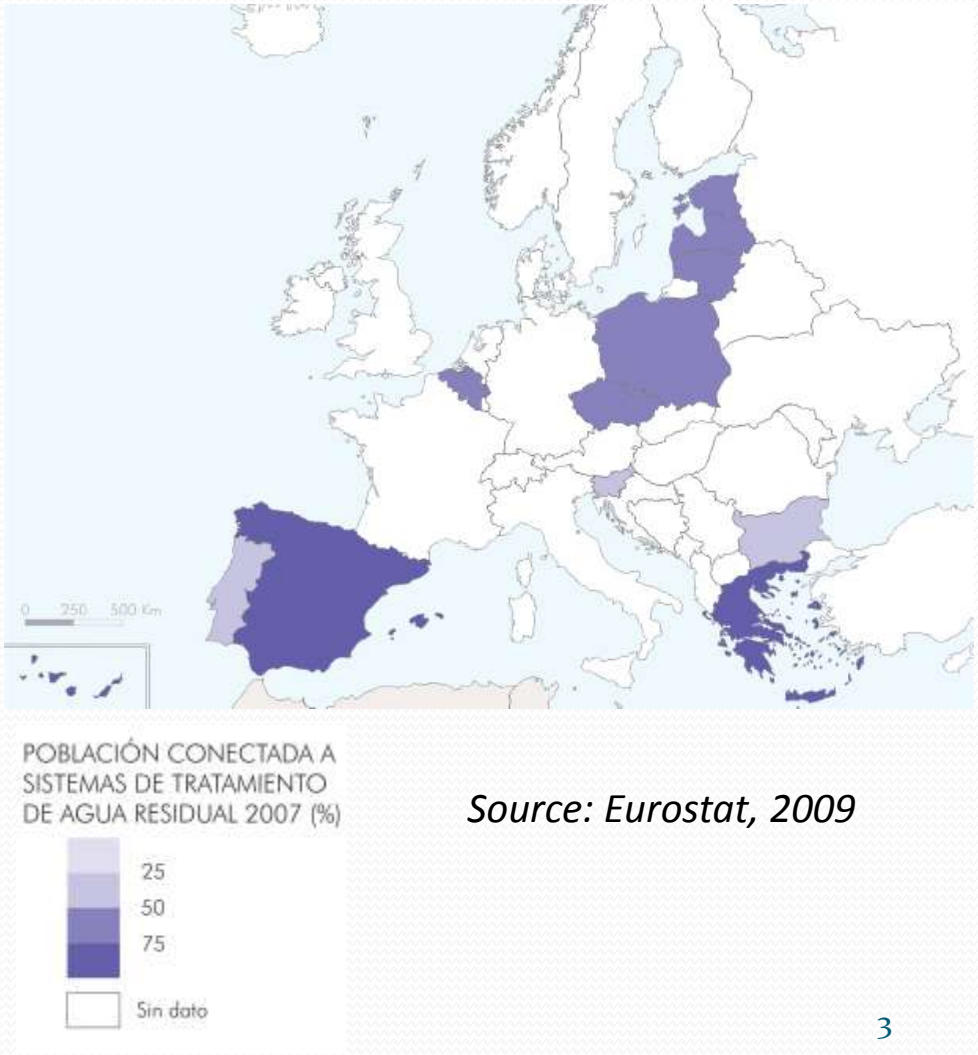
1. Introduction and objectives

- Directive 91/271/EEC: since 01/01/2006 all the wastewater generated in urban agglomerations must be treated before its discharge.

- National Plan for Sanitation and Wastewater Treatment (1995-2005): infrastructures (WWTP) for large populations (those that produces a higher pollution load) → 80% of compliance with the 91/271/EEC Directive.
- Royal Decree 11/95



Source: Eurostat, 2009

1. Introduction and objectives

- National Plan for Water Quality (NPWQ): Sanitation and Purification (2007-2015) → achieve **100%** of wastewater treatment and contribute to the good ecological status defined by the Water Framework Directive for 2015.
- The NPWQ devotes special attention to the purification of wastewater in small populations (less than 2,000 p-e.) which required an *appropriate treatment.*

Which is the current situation of sanitation and wastewater treatment in Spanish populations?

✓ Lack of official information about the population served in small communities.

1. Introduction and objectives

- CEDEX and CENTA have conducted a study on “The sewage treatment in small agglomerations”, with three basic objectives:
  - ✓ The study of the current trends in wastewater treatment in small urban areas in Spain and other European countries and elsewhere.
  - ✓ The analysis of the situation of R&D activities, establishing lacks and requirements on that field.
  - ✓ The development of a guide for the implementation of appropriate and sustainable treatment systems for small settlements.

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2. Methodology

- Literature's revision:
  - ✓ Regional plans for Sewerage and Purification promulgated by the diverse Spanish Regional Authorities.
  - ✓ Official Reports of the Ministry of Environment and Marine and Rural Affairs.
  - ✓ International publications and legislative documents related to wastewater treatment in small agglomerations.

- As a key element to know the exact level of sewage treatment in the small Spanish populations, direct information from the regional authorities was collected by both **questionnaires** and **workshops**.

2. Methodology

Example: Table for compiling data regarding the distribution of population in small agglomerations

Region:	< 50 p-e	50-100 p-e.	100-500 p-e.	500-1,000 p-e.	1,000-2,000 p-e.	TOTAL
Number of agglomerations						
Population equivalent						
% treated in terms of agglomerations						
% treated in terms of population equivalent						
Population scattered						
Other comments						

2. Methodology

Example: Table for compiling data regarding the technologies applied in small WWTP

Region	1st technological option (the widest)	2nd technological option	3rd technological option	Other applied technologies
< 500 p-e				
500 – 1.000 p-e				
1.000 – 2.000 p-e				
Comments				

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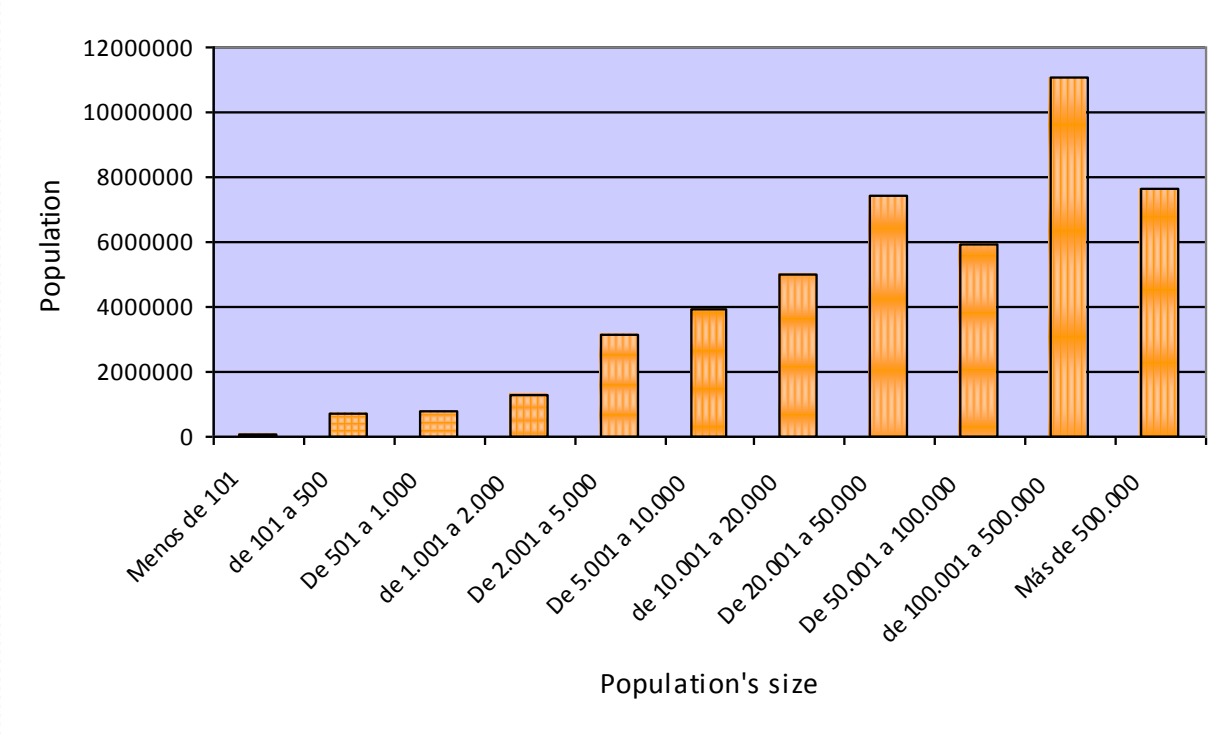
3. Results and discussion

- Distribution of population according to the agglomerations' size (2010):



✓ Only 6% of the Spanish population lives in small communities (2,811,766 inhabitants)

3. Results and discussion

- ✓ 2,381 urban agglomerations
- ✓ 71,739,629 p-e (2010).
- ✓ > 95% population connected to sewerage network.
- ✓ > 80% in conformity with the Directive 91/271/EEC .

- ✓ Low level of treatment in small populations (less than 40-50%).
- ✓ Estimated load about 3-4 million p.e. (< 5% of the total p-e).
- ✓ More than 6,000 small agglomerations (most of them with less than 500 p.e.).

3. Results and discussion

- Legal framework:
  - ✓ Royal Decree Law 11/95 on urban wastewater treatment.
  - ✓ Royal Decree 509/1996 and Royal Decree 2116/1998.

DISCHARGE IN COASTAL WATER BODIES			
Agglomerations' size	Less sensitive areas	Normal areas	Sensitive areas
0 – 10,000 p-e.	T.A	T.A	T.A
10,000-150,000 p-e.	T. 1º	T.2º	T.3º
>150,000 p-e.	T.2º (ó T.1º)	T.2º	T.3º

DISCHARGE IN SUPERFICIAL WATER BODIES				
Agglomerations' size	Less sensitive areas	Normal areas	Normal area (high mountain)	Sensitive areas
0 –2,000 p-e.	T.A	T.A	T.A	T.A
2,000-10,000 p-e.	T.1º	T.2º	T.2º (-)	T.2º
> 10,000 p-e.	T.2º	T.2º	T.2º (-)	T.3º

  - ✓ Applied discharge limits: 125 mg COD/l, 25 mg BOD_5/l and 35 mg SS/l.
- CEN Standard 12566-3:2005+A1:2009. Small wastewater treatment systems for up to 50 PT — Part 3: Packaged and/or site assembled domestic wastewater treatment plants → Obligatory since 1st November 2010

3. Results and discussion

- Planning sanitation and wastewater treatment in small populations
  - ✓ New regional programs address a noticeable portion of their investments to the treatment of small populations.
  - ✓ Definition of agglomerations → difficulties in the formation of larger clusters.
  - ✓ Differences in diverse Spanish regions (high or low density).
  - ✓ Tools for supporting the decision-making process.

Densidad de población

Mínimo	Máximo	Color
0	10	
10	25	
25	50	
50	100	
100	250	
250	500	
500	1000	
1000	50000	

3. Results and discussion

- Technological approaches

Regions	1st technological option	2nd technological option	3rd technological option	Other applied technologies
Andalucía	Tratamiento primario*	Aireación prolongada	Filtros de turba	CBR, Lagunaje, Humedal Artificial, Lechos bacterianos
Aragón	Aireación prolongada	Lechos bacterianos	Biodiscos	Tratamiento primario
Asturias	Tratamiento primario*	Aireación prolongada	Lagunaje	Biológico con eliminación de N y P
Cantabria	Aireación prolongada	Aireación prolongada+ lagunaje	Tratamiento primario	
Castilla-La Mancha	Aireación prolongada y lagunaje	Aireación prolongada y lagunaje	Lechos bacterianos	CBR, tratamientos primarios y filtros verdes
Castilla y León	Tratamiento primario*	Aireación prolongada	Fosas sépticas + filtros biológicos	Lagunaje, lechos bacterianos, filtros de turba
Cataluña	Aireación prolongada	Biodiscos	Humedales artificiales, filtros verdes, lechos bacterianos	Lagunaje, tratamientos primarios
Extremadura	Aireación prolongada	Biodiscos	Lechos bacterianos	Lagunaje
Galicia	Aireación prolongada	Lecho bacteriano	Tratamiento primario	Tratamiento físico-químico
La Rioja	Aireación prolongada	Lechos bacterianos	Lagunaje	Biocilindros
Madrid	Aireación prolongada	Biodiscos	Lechos de turba	Filtros verdes
Navarra	Tratamiento primario (fosa séptica)	Lechos bacterianos	Biomasa fija sobre lecho móvil (MBBR)	Humedal y filtro de arena + lagunaje, aireación prolongada
Valencia	Aireación prolongada	Lechos de turba	Biodiscos/ biocilindros	Lechos bacterianos
País Vasco	Tratamiento primario*	Zanjas, lechos y pozos filtrantes, lagunaje, filtros de turba	Aireación Prolongada	

3. Results and discussion

- Technological approaches
  - ✓ Both intensive and extensive technologies are implemented in small populations.
  - ✓ Extended aeration is widely used (specially in populations over 1,000 p-e.).
  - ✓ In populations < 500 p-e → extensive systems are promoted.

3. Results and discussion

- Management of small WWTP
  - ✓ The construction of new wastewater treatment facilities is mainly financed through regional and/or state funds (works declared of General interest).
  - ✓ Once built, their exploitation is responsibility of the municipalities.
  - ✓ Many managing problems have been observed → lack of financial and human resources for their operation and maintenance (O&M).

3. Results and discussion

- Management of small WWTP
  - ✓ To solve those management problems:
    - o Inter-municipality management.
    - o Management through regional public entities (responsible for collecting the cannon of sanitation).
    - o Management through public entities at a sub-regional level and the management through Water Agencies or similar entities.
  - ✓ Water fee or cannon → practically widespread in the entire territory.

3. Results and discussion

	Wastewater treated in Spain (10^3 m^3)	Incomes from the sanitation and wastewater treatment fee (10^3 €)	€/ m^3
España	**12371505**	**1851494**	**0,15**
Andalucía	1488514	267801	0,18
Aragón	617991	69785	0,11
Asturias	273866	40169	0,15
Balears (Illes)	291718	77942	0,27
Canarias	340174	48350	0,14
Cantabria	254799	20232	0,08
Castilla y León	1297653	103715	0,08
Castilla-La Mancha	508587	55097	0,11
Cataluña	1821859	362795	0,20
Comunitat Valenciana	1402775	240585	0,17
Extremadura	385720	40789	0,11
Galicia	737520	58898	0,08
Madrid	1515336	257560	0,17
Murcia	288243	75322	0,26
Navarra	313229	35900	0,11
País Vasco	616474	77837	0,13
Rioja (La)	195047	15536	0,08
Ceuta y Melilla	22000	3181	0,14

Source: INE 2010

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4. Conclusions

- There is a lack of information about the state of sewage treatment at small agglomerations. Neither the Commission nor the Member States have evaluated the pollution load associated to communities less than 2,000 p.e that is not properly treated.
- Regarding the technological solutions for small WWTP: intensive and extensive technologies are applicable → Importance of both identifying adequate criteria for the selection and improving the knowledge of each of the treatment systems (design, applicability, construction and O&M).
- It is advisable the inter-municipality management of small WTTP for sharing both human resources and operating costs. In addition, it is desirable the constitution of a regional entity to conduct the monitoring and the management of the funding instruments (water fee).

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Thanks very much for your attention

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