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THE DECREASE OF DOMESTIC WATER CONSUMPTION IN THE COAST OF ALICANTE (SPAIN) 2000-2013.STUDY ABOUT THE DIFFERENT URBAN TYPOLOGIES

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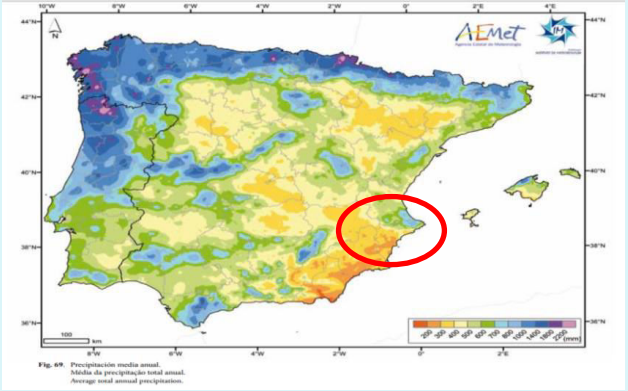
STUDY AREA

- The coast of the **province of Alicante (Spain)**
- This area is charachteristic by:
  - **Semi-arid region**: 350 mm/year
  - **Scarcity** of water resources
  - Frecuent periods of **droughts :** (1992-1996), (2005-2009), (2014)
  - Important **tourist activity** since 1960
  - Increase of **urban sprawl**
  - **New urban natures**: gardens and swimming pools

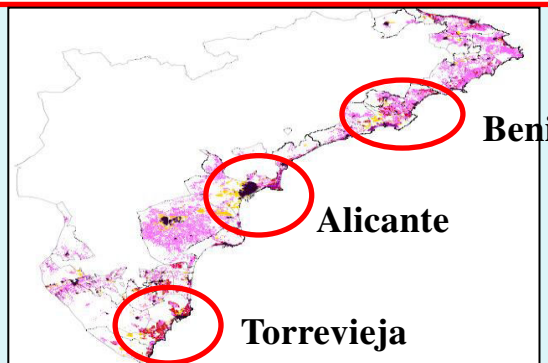


OBJECTIVES

- Analyze **urban sprawl processes** and the change in **urban models** that have taken place in the coast of Alicante
- Study area: **Alicante, Benidorm and Torrevieja**
- Know the tendency of the **evolution of domestic water consumption** per urban typologies
- Identify the **causes** that explain the **decrease** of water consumption (2000-2013)
  - Structural causes
  - Conjunctural causes

METHODOLOGY

- **Stadistic analysis with real data about:**
  - ✓ Domestic water consumption **per city (2000-2013)**
  - ✓ Domestic water consumption **per urban typology (2005-2013)**
  - ✓ Domestic water consumption about 200 houses
  - ✓ Company: Hidraqua, Gestión Integral de Aguas de Levante S.A



URBAN TYPOLOGIES

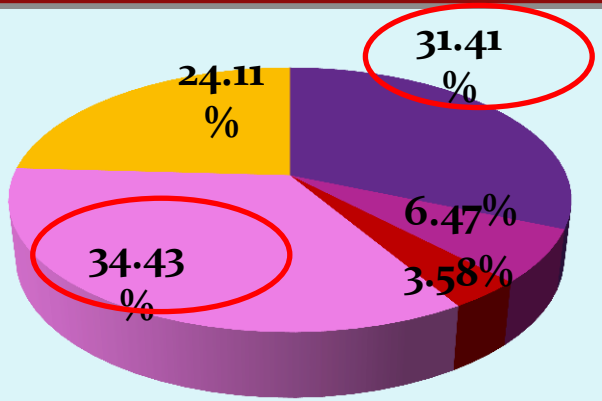
Urban core: without outdoor elements

Blocks of apartments: with garden and swimming pool in condominium

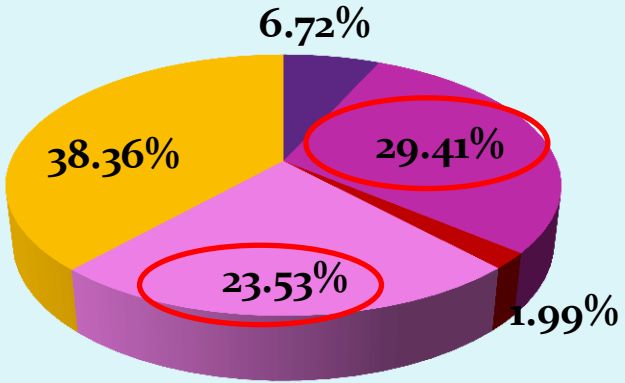
Terraced houses (bungalows): with a small single-family garden and garden and swimming pool in condominium

Detached houses: with a single-family garden and swimming pool

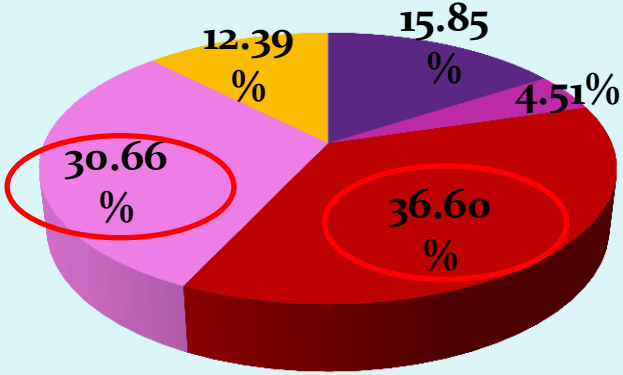
URBAN TYPOLOGIES: 2015



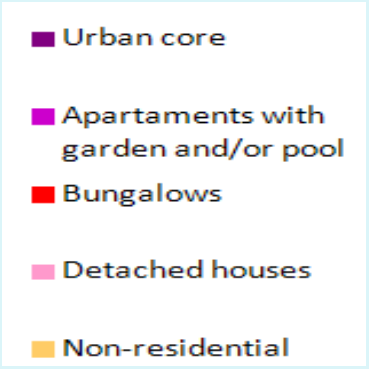
Alicante



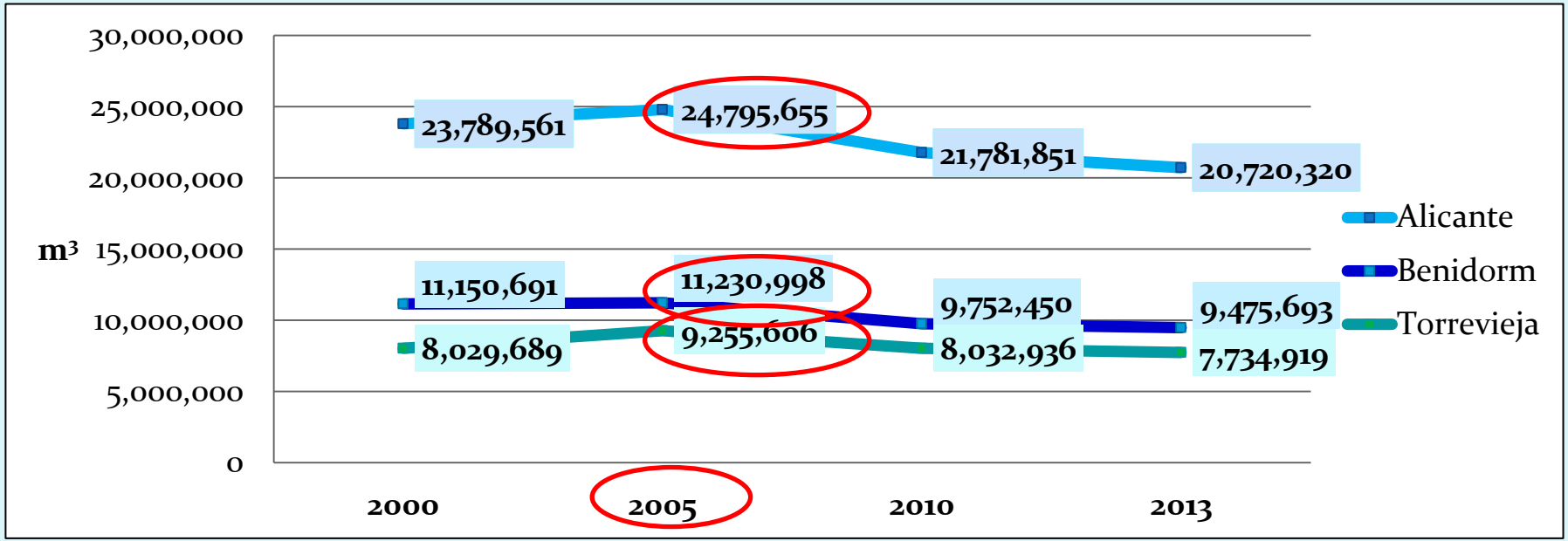
Benidorm



Torrevieja



EVOLUTION OF DOMESTIC WATER CONSUMPTION

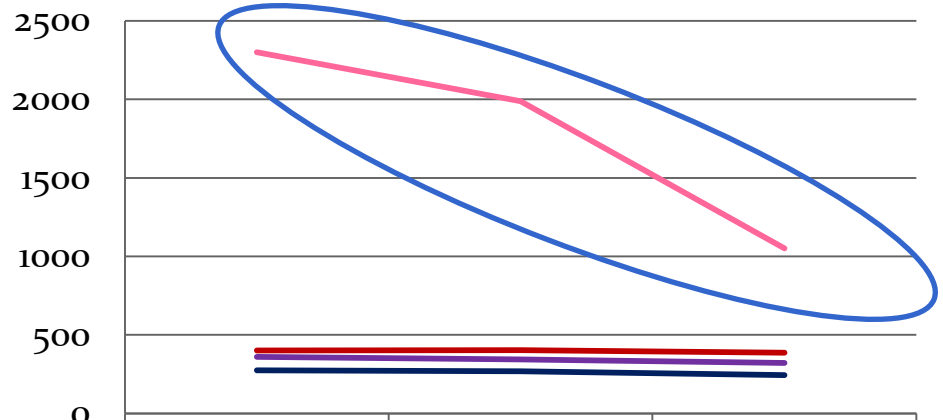


Source: Hidraqua, Gestión Integral de Aguas de Levante S.A.

Percentaje of decrease (2005-2013):

✓Alicante (-16.43%); Benidorm (-15.62%); Torrevieja (-16.42%)

DOMESTIC WATER CONSUMPTION PER URBAN TYPOLOGY (litres/house/day)



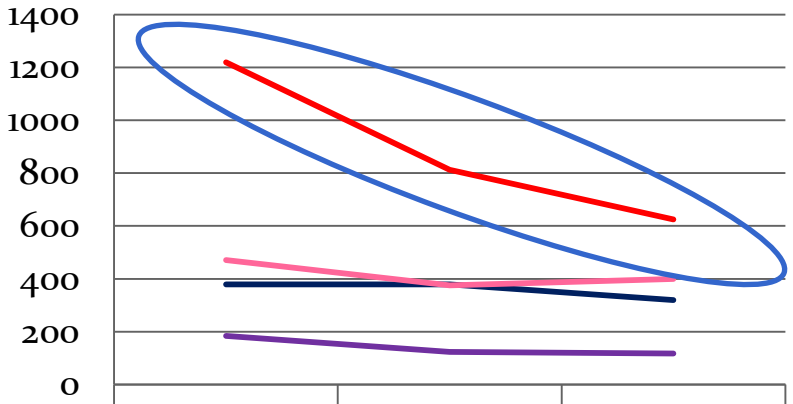
	2005	2010	2013
Urban core	274	269	244
Apartamens	360	344	322
Terraced houses	402	403	387
Detached houses	2300	1989	1052

Source: Hidraqua, Gestión Integral de Aguas de Levante S.A.

Decrease in **detached houses**: **-54.26%**

Alicante

DOMESTIC WATER CONSUMPTION PER URBAN TYPOLOGY (litres/house/day)



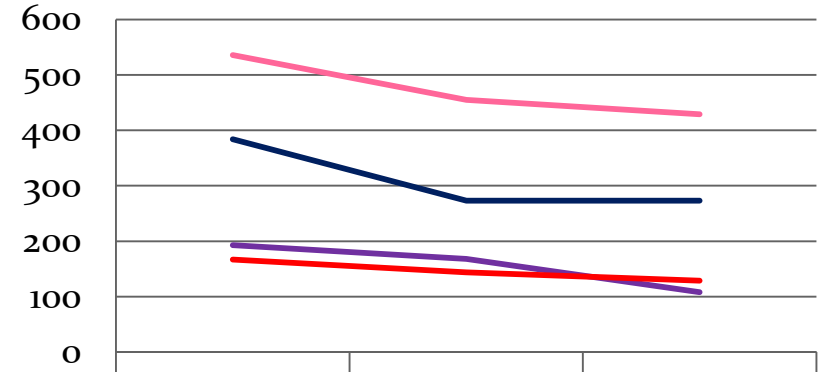
	2005	2010	2013
Urban core	379	379	320
Apartamens	184	124	118
Terraced houses	1219	812	625
Detached houses	471	375	399

Source: Hidraqua, Gestión Integral de Aguas de Levante S.A.

Benidorm

Decrease in **apartments** (-35.86%) and **terraced houses** (-48.72%)

DOMESTIC WATER CONSUMPTION PER URBAN TYPOLOGY (litres/house/day)

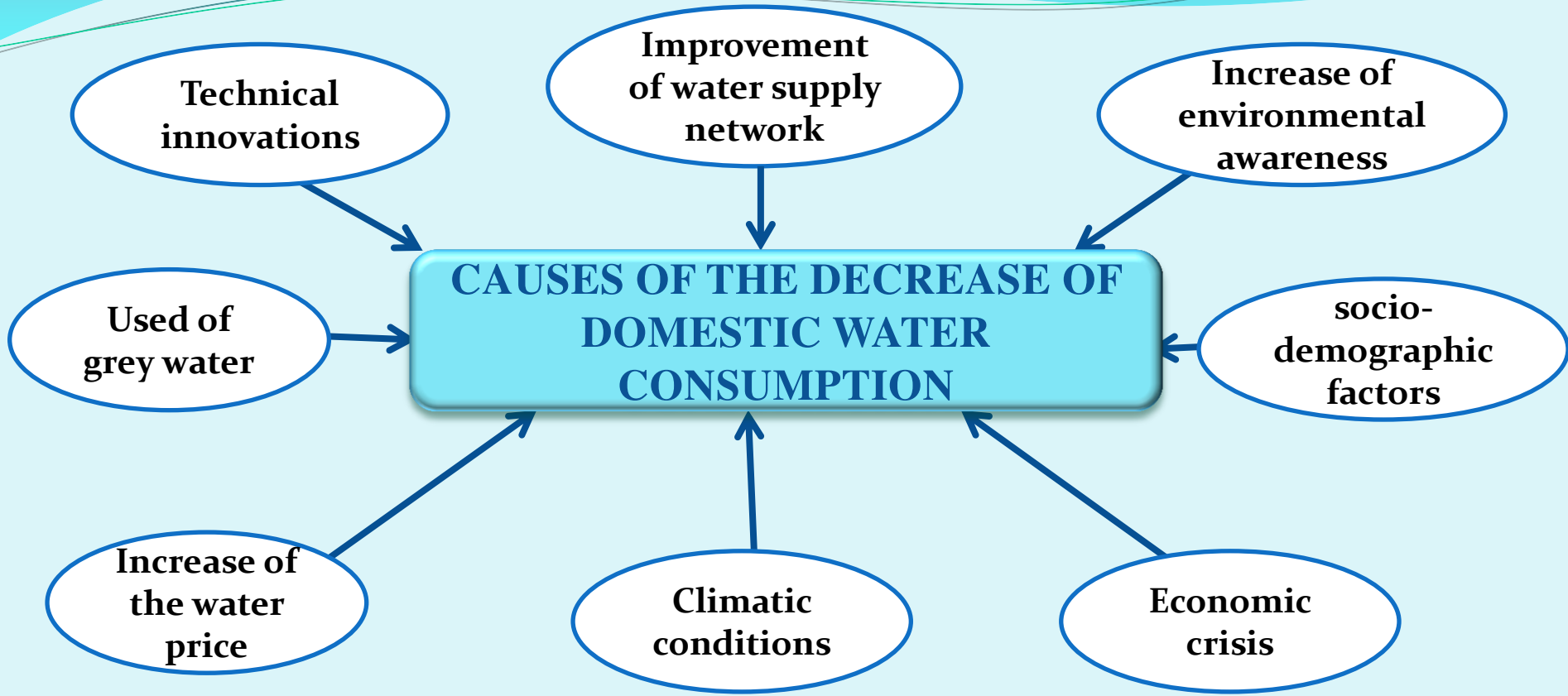


	2005	2010	2013
Urban core	384	273	273
Apartamens	193	168	108
Terraced houses	167	144	129
Detached houses	536	455	429

Source: Hidraqua, Gestión Integral de Aguas de Levante S.A.

Torrevieja

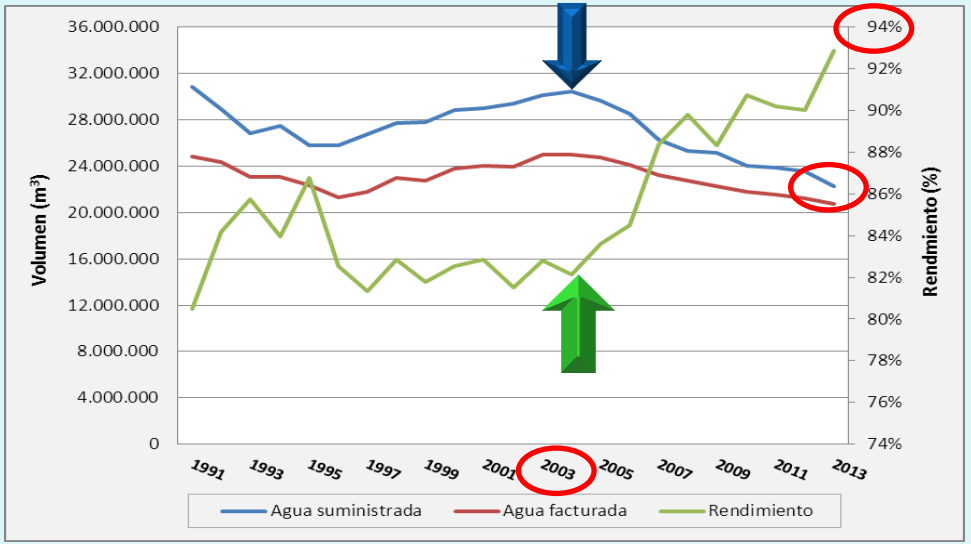
Decrease in **apartments** (-44.04%) and **terraced houses** (-22.75%)


Technical innovations
Improvement of water supply network
Increase of environmental awareness
CAUSES OF THE DECREASE OF DOMESTIC WATER CONSUMPTION
Used of grey water
socio-demographic factors
Increase of the water price
Climatic conditions
Economic crisis

Estructural causes

❑**Improvement of water supply network** (nowadays the efficiency of water supply is around **85-90%**). In the **1970s**, the efficiency was around **70% or less**.

Supply water and efficiency in the city of Alicante (1991-2013)

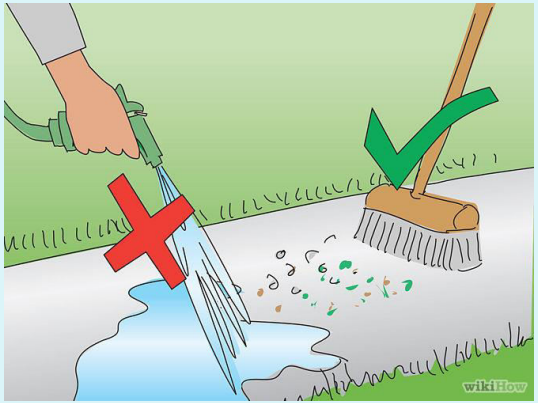


Source: AMAEM

❑ **Technical innovations:** Installation of **saving devices** (faucets, showers and toilets) and **appliances more efficient** in the use of water:

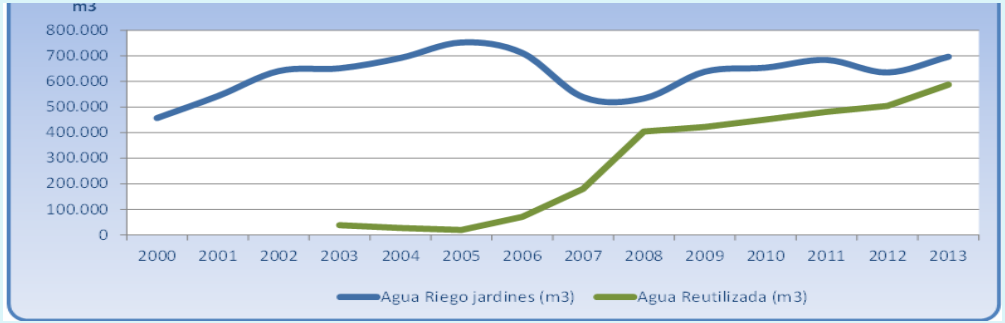
- •Faucet (savings between **40-50%**)
- •Washing machine and diswasher (**40-60%**)
- •Toilets (**50%**)
- •Showers (**40-50%**)

❑ **Increase of environmental awareness**. Progression and retention of habits with the aim of saving water. Environmental campaigns **started in the 1990s with the droughts**



❑**Use of grey water** for watering private garden and public parks and green areas. The use of this water has been decrease the consumption around the **30%.**

Evolution of used water for watering greeen areas for the council of Alicante



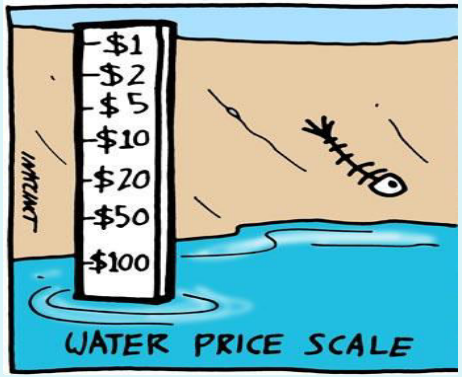
Source: AMAEM

Evolution of used water in the detached houses in Vistahermosa (city of Alicante)

	Grey water (m^3)	Drinking water (m^3)	% Grey water
2007	**1.830**	**152.334**	**1,19%**
2008	4.544	154.756	2,85%
2009	30.109	129.793	18,83%
2010			28,93%
2011			26,70%
2012			37,37%

Grey water **5 times more cheaper** than drinking water (**0,32 €/m^3**)

❑Increase of **water prices**



Evolution of water prices in the city of Alicante.
Example of a bill with 30 m³ (2000-2013)

	2000	2007	2013	% increase 2013-2007
Water				
• Fee service	10,98 €	16,17 €	21,96 €	**100,00**
• Consumption (30 m³)	9,17 €	9,21 €	11,31 €	**23,33**
Counter conservation	1,32 €	1,59 €	1,71 €	**29,54**
Sewerage				
• Fee service	2,36 €	3,87 €	4,56 €	**93,22**
• Consumption	1,62 €	1,65 €	1,65 €	**1,85**

Source: AMAEM.

Increase of 77% in one decade

Conjunctural causes

❑**Socio-demographic factors**:

- **Slowing** population growth
- **Population reduction** (projections)
- **Aging of the population**

In the city of Alicante

✓Between 2000 a 2004, the pop. grew **41.830** inhabitants

✓Between 2005 a 2013, the pop. Grew **15.187** inhabitants

✓Estimated population loss in the province of Alicante (**-27.673** inhabitants in 2014)

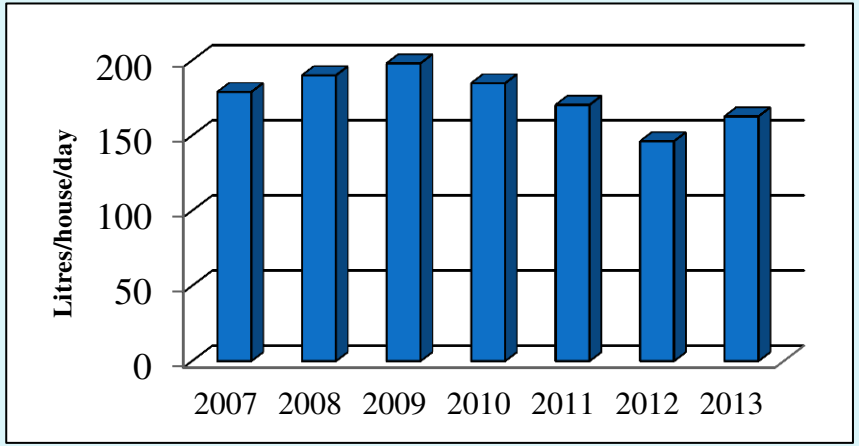
❑ Economic crisis

- ➢ Low occupancy of second homes **(decrease of water consumption)**

- ➢More houses that were built during the **real estate bubble**, they don't have the contract with the water company

- ➢**Reduction** of the consumption in general

Evolution of water consumption in second homes in the summers of 2007-2013



Source: AMAEM

Evolution of houses in the city of Alicante(1991-2011)

	Main	Second	Empty	Total
1991	82.695	**33.252**	**15.791**	131.738

❑ Climatic conditions

- ➢ **Drouhgts** (1992-1996), (2005-2009), (2014-…..?)

- ➢ **Change the behaviour** of the population (**increase of environmental awareness)**
  - ▪Change the typology of the garden (**atlantic** versus **mediterranean**),
  - ▪Practice of **xeriscape**
  - ▪**Paving** the garden
  - ▪Installation of **saving devices** in homes and outdoor areas
  - ▪ **Less use and frequency** of water using devices

CONCLUSIONS

❑Water consumption shows a decrease trend since 2004/05. **Decrease of 15,6% (2007-2013).**

❑The decrease of domestic water consumption has been influencied by **structural and conjunctural** factors

- **Estructurals**: **improvements** of water supply neetwork, installation of **saving devices**, increase of **environmental awareness**, used of **grey water** and the increase of **water prices**
- **Conjunctural**: **Slowing population growth**, **economic crisis** and **climatic conditions**

CONCLUSIONS

❑ The **periods of drouhgts and the economic crisis** have been an important incidence in domestic water consumption and the installation of saving devices in homes

❑The **TENDENCY IN THE FUTURE??? Stability, increase o decrease???**

➢In the **city of Alicante** between 2013 and 2014, domestic water consumption had been decreased in **1.000.000 m^3 (-4,8% in one year)**

THANK'S

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