

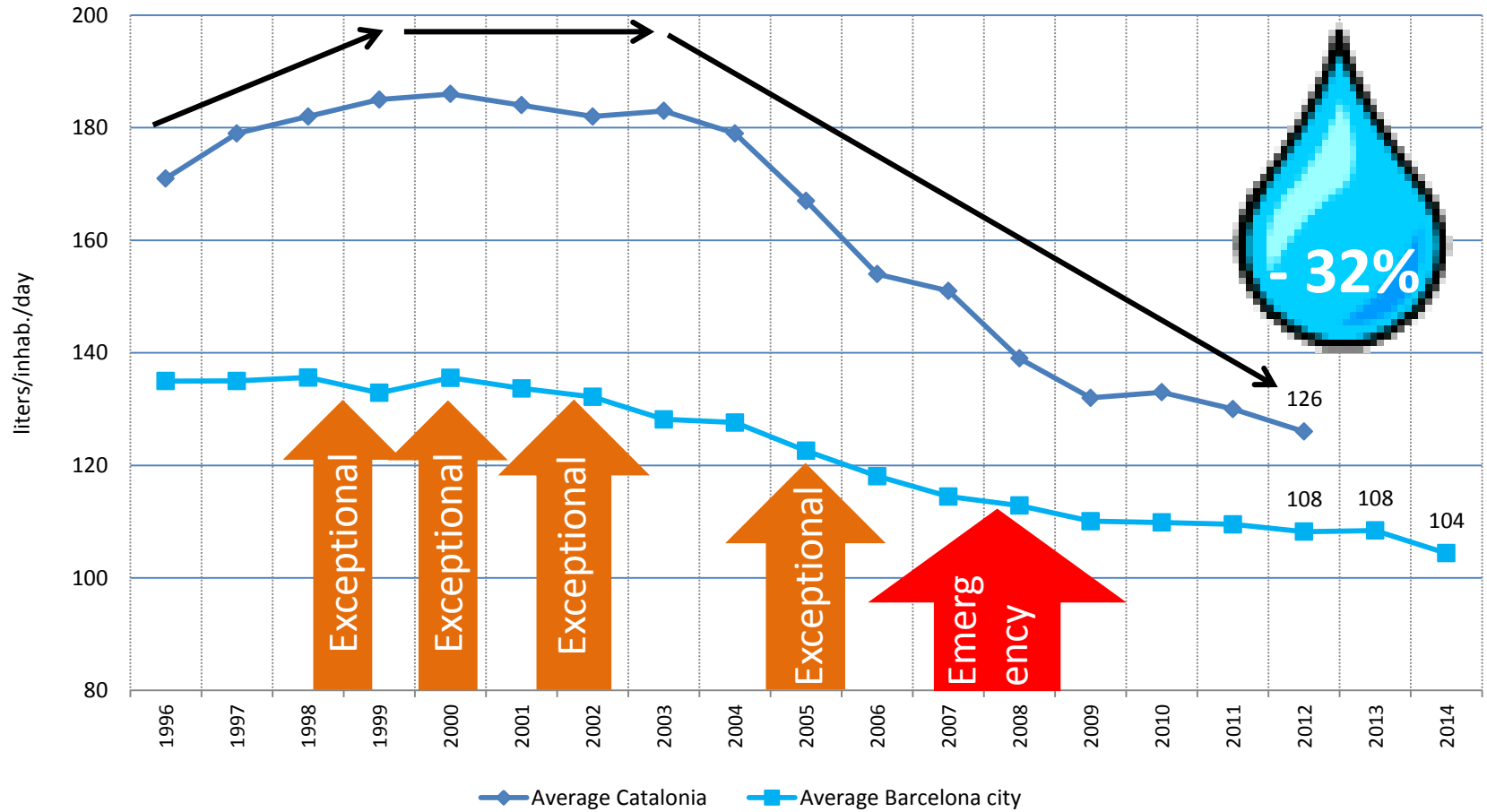


# Domestic water uses and new technologies: A case study in Catalonia

World Water Congress XV  
International Water Resources Association (IWRA)  
Edinburgh (Scotland), 25-29 May 2015  
Theme area: Management of water resources

# Introduction

Recent evolution in domestic water consumption (liters/inhabitant/day), Catalonia and Barcelona



# “The perfect storm”

## SOCIO-ECONOMIC FACTORS

- 78,8% increase in the water bill 2008-2014 (based on a consumption of 12 m<sup>3</sup>/month)

## TECHNOLOGICAL FACTORS

- Implementation of water saving devices and efficient water appliances
  - **SUBSTITUTION**

## DOMESTIC WATER CONSUMPTION

## CLIMATE FACTORS

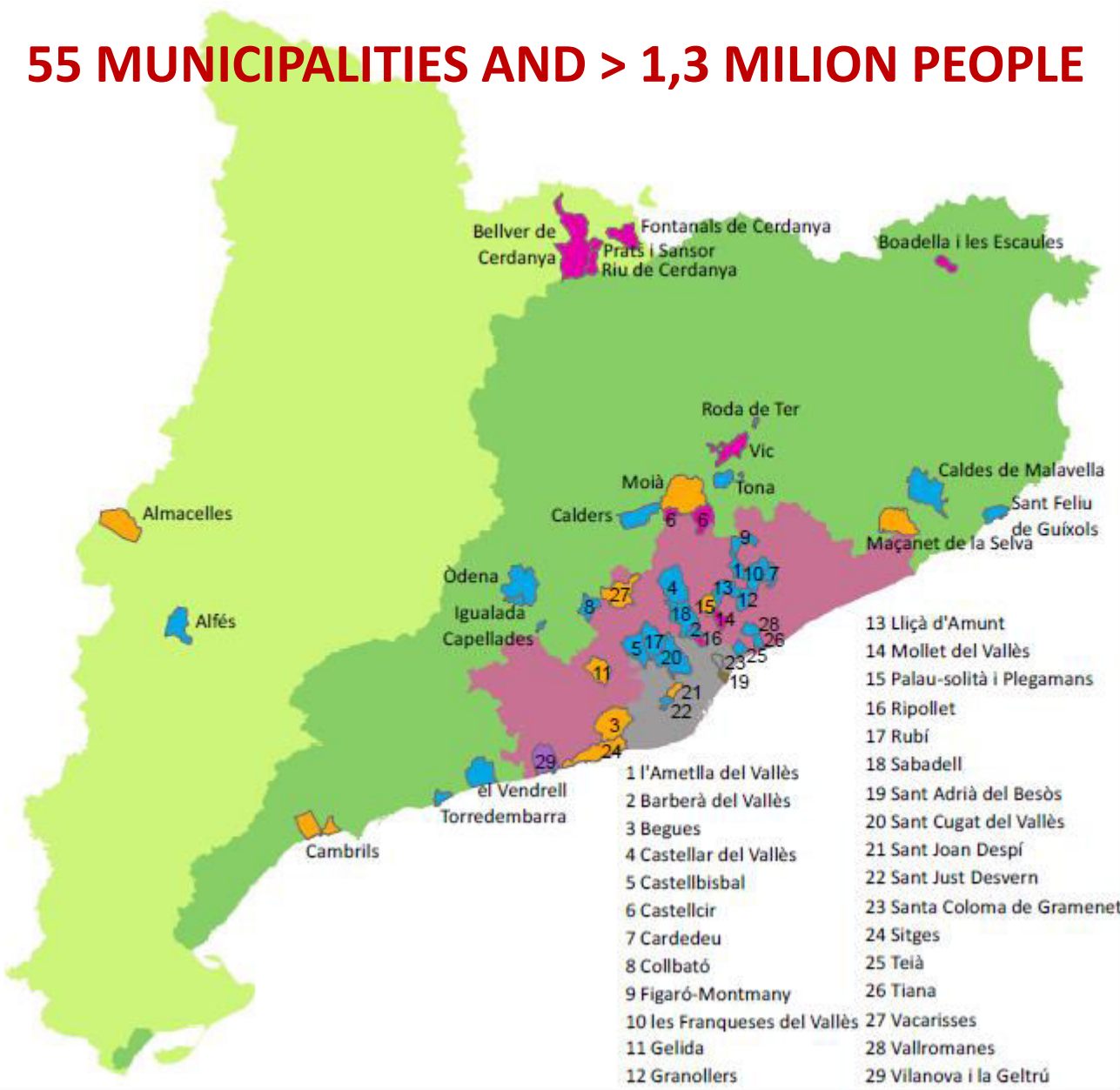
- Climate change impacts and effects

## POLITICAL AND CULTURAL FACTORS

- New legislation: WFD (2000), TBD (2006), local ordinances for water saving (since 2002)
  - New Water Culture

# Local ordinances for water saving

**55 MUNICIPALITIES AND > 1,3 MILION PEOPLE**



## Substitution measures in the ordinances

Legend:

RW = Rainwater tank  
 GW = Greywater system  
 RSPW = Reused Swimming Pool Water

- RW + GW + RSPW
- RW + RSPW
- RW + GW
- RW
- GW + RSPW
- NO SUBSTITUTION MEASURES
- Metropolitan Area of Barcelona
- Metropolitan Region of Barcelona
- Catalan Internal Basins
- Catalan Interregional Basins



# Objective & methodology

## WHAT?

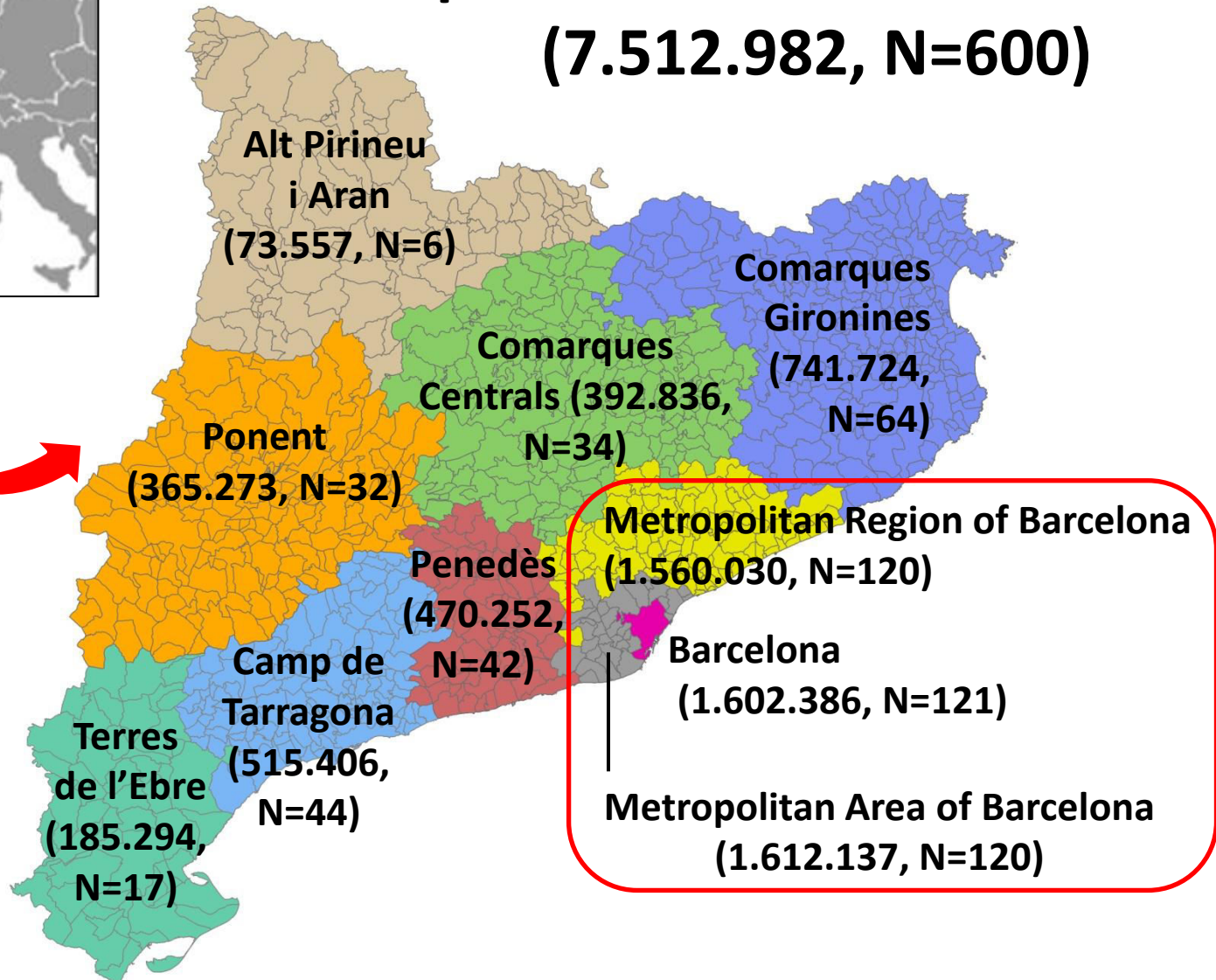
To explore the **informal and non-centralised** use of alternative water sources for different uses in Catalan households.

## HOW?

Telephone survey of households in Catalonia stratified according to gender and area of residence (N=600). **Conducted from 14 to 29 April 2015.**

# Study area

## Population of Catalonia in 2014 (7.512.982, N=600)



# Matrix of uses and alternative water sources

Use (12)

Alternative water source (11)

Rainwater tank



Greywater system



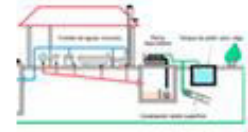
Private well



Reused swimming pool water



Regenerated water



Other

Reused cooking water



Collect shower water in buckets



Purchased bottled water



Drinking fountain (potable water)



Spring fountain (natural)



- Drinking
- Cooking
- Shower or bath
- Personal care
- Toilet flushing
- Clothes washing
- Cleaning (domestic)
- Plants watering
- Car washing
- Ornamental garden
- Vegetable garden
- Swimming pool

# Results I

## 1. Are households using alternative water sources?

Use of alternative water sources in Catalan households connected to a centralised water supply

Use	N	Stated frequency of use: percentage of respondents					NR/DK
		Always	Sometimes	Sum of always and sometimes	Never	Not applicable	
Drinking	590	46.1	11.9	58.0	41.7	0.3	0
Cooking	592	9.5	7.6	17.1	82.6	0.3	0
Shower or bath	593	1.0	0.7	1.7	97.6	0.7	0
Personal care	593	1.2	0.3	1.5	97.8	0.7	0
Toilet flushing	593	0.7	0.3	1.0	98.2	0.5	0.3
Clothes washing	593	0.8	0.3	1.1	98.2	0.7	0
Cleaning (domestic)	592	0.7	0.3	1.0	98.3	0.7	0
Plants watering	470	5.3	3.0	8.3	90.6	0.6	0.4
Car washing	152	2.6	1.3	3.9	94.1	1.3	0.7
Ornamental garden	179	8.6	3.5	12.1	83.9	1.2	2.9
Vegetable garden	62	19.4	8.1	27.5	62.9	8.1	1.6
Swimming pool	67	3.0	4.5	7.5	79.1	6.0	7.5



# Results II

## 2. If so, what water sources are they using? And for what purpose?

What alternative water sources are used for different purposes: Catalan households connected to a centralised water supply

Use	N	Alternative water source: percentage of respondents who use each alternative water source for each particular use											
		Rainwater tank	Greywater system	Private well	Regenerated water	Reused swimming pool water	Reused cooking water	Collect shower water in buckets	Purchased bottled water	Drinking fountain (potable water)	Spring fountain (natural)	Other	NR/DK
Drinking	342	0.3	0	0.9	0.6	0	0	0	87.7	1.2	2.3	6.7	0.3
Cooking	101	1.0	0	1.0	2.0	0	0	0	74.3	2.0	5.0	13.9	1.0
Shower or bath	10	10.0	0	10.0	10.0	0	0	0	0	0	0	50.0	20.0
Personal care	9	11.1	0	0	11.1	0	0	0	11.1	0	0	44.4	22.2
Toilet flushing	6	0	0	0	0	0	0	0	0	0	0	66.7	33.3
Clothes washing	7	14.3	0	0	0	0	0	0	0	0	0	57.1	28.6
Cleaning (domestic)	6	0	0	0	0	0	0	0	0	0	0	66.7	33.3
Plants watering	39	33.3	0	7.7	0	0	2.6	28.2	5.1	0	18.0	5.1	
Car washing	6	0	0	16.7	0	0	0	0	16.7	0	50.0	16.7	
Ornamental garden	21	42.9	0	19.1	0	0	0	0	0	4.8	23.8	9.5	
Vegetable garden	17	35.3	0	23.5	0	0	0	0	5.9	0	23.5	11.8	
Swimming pool	5	60.0	0	20.0	0	0	0	0	0	0	0	20.0	

# Results III

## 3. How long do they have been using these alternative water sources?

## And 4. Are they satisfied with them?

Average length of time alternative water sources used and satisfaction\* levels: Catalan households connected to a centralised water supply

Alternative water source used	N	Length of time alternative water source used		Satisfaction with alternative water source	
		Average time used (years)	SD	Mean	SD
Rainwater tank	17	16.5	11.4	8.8	1.5
Greywater system	0	-	-	-	-
Private well	9	22.8	15.5	7.9	1.2
Reused swimming pool water	0	-	-	-	-
Regenerated water	2	4.0	1.4	10.0	0.0
Reused cooking water	0	-	-	-	-
Collect shower water in buckets	1	16.5	-	-	-
Purchased bottled water	304	19.9	15.7	7.9	2.1
Drinking fountain (potable water)	4	16.0	13.6	9.0	1.2
Spring fountain (natural)	10	24.1	12.2	7.9	3.4

\*Satisfaction was rated on a scale of 0-10 where 0 = not at all satisfied and 10 = extremely satisfied.



# Initial conclusions

- Substitution is still **anecdotally** in the majority of uses and is **not a recent trend, but an habit**
- Substitution is specially due to **quality concerns regarding potable water rather than quantity issues**
- Substitution has **not** been **a relevant factor in “the perfect storm”** occurred in Catalonia over the last 10 years, so there is **capacity to continue reducing domestic water consumption**



# Future work

- Explore the differences between urban, periurban and rural areas to test the influence of **different urban models (compact vs sprawl)**
- Compare the results in Catalonia with similar studies conducted in other places, such as in **Victoria (Australia)**



*Thank you for your attention!!*

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