



**ELABORATION OF A DATABASE ON
WATER USE AND MANAGEMENT IN
THE SPANISH MEDITERRANEAN COAST:
*STATE OF THE ART AND
FIRST EXPLORATORY ANALYSIS FOR
CATALAN MUNICIPALITIES***

Maria Vallès, Hyerim Yoon and Hug March

Overview & objectives

Phase I: 2014 Seminar

Database elaboration
Snapshot study area
Exploration on LA21



- What do water indicators provided by ACA tell us?
- Which factors are the most important to understand the differences of water consumption among the coastal municipalities?

Methodology I: ACA indicators

PORT DE LA SELVA, EL

A B C D E F G H I
Evolució volums anuals facturats 2011-2013 (dades en m³)

Dades origen xarxa

1
2
3

Data Valor Dades (a)	Any	Domèstic		Industrial				Total		Origen Dades
		% (*)	Tarificació Per Volum	Mesurament Directe	Total Industrial	% (*)	% (*)			
14/07/2014	2013	258.717	-2,19%	61.409	7.873	69.282	7,60%	327.999	-0,27%	Declaració Resum Facturació
04/09/2013	2012	264.510	-1,00%	58.148	6.240	64.388	0,92%	328.898	-0,63%	Declaració Resum Facturació
15/11/2012	2011	267.185		58.066	5.733	63.799		330.984		Declaració Resum Facturació

Dades origen fonts pròpies (**)

4
5
6

Data Valor Dades (b)	Any	Domèstic		Industrial				Total	
		% (*)	Tarificació Per Volum	Mesurament Directe	Total Industrial	% (*)	% (*)		
14/07/2014	2013	92	411,11%	1.040	0	1.040	-44,83%	1.132	-40,51%
14/07/2014	2012	18	0,00%	1.885	0	1.885	-5,75%	1.903	-4,85%
14/07/2014	2011	0		2.000	0	2.000		2.000	

$$DWCPi, 2013 = \frac{A7}{F7 \cdot 365}$$

Dades totals

7
8
9

Any	Domèstic		Industrial				Total		Població IDESCAT (1)	Ratio s/volum domèstic lit/pers/dia	Població Bàsica (2)	Dotació (3) lit/pers/dia
	% (*)	Tarificació Per Volum	Mesurament Directe	Total Industrial	% (*)	% (*)						
2013	258.800	-2,16%	62.449	7.873	70.322	6,11%	329.131	-0,50%	990	716	3.720	242
2012	264.528	-0,99%	60.033	6.240	66.273	0,72%	330.801	-0,66%	1.011	717	3.718	244
2011	267.185		60.066	5.733	65.799		332.984		1.009	725	3.656	250

A B C D E F G H I

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$$Allowance, 2013 = \frac{E7 - C4}{H7 \cdot 365}$$

$$H7 = F7 + 0.4 \cdot Seasonal Population$$

Dades totals

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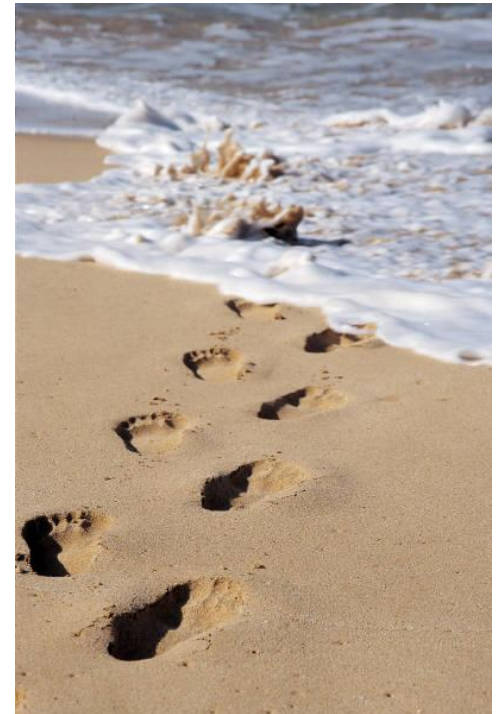
A B C D E F G H I

Methodology I: ACA indicators

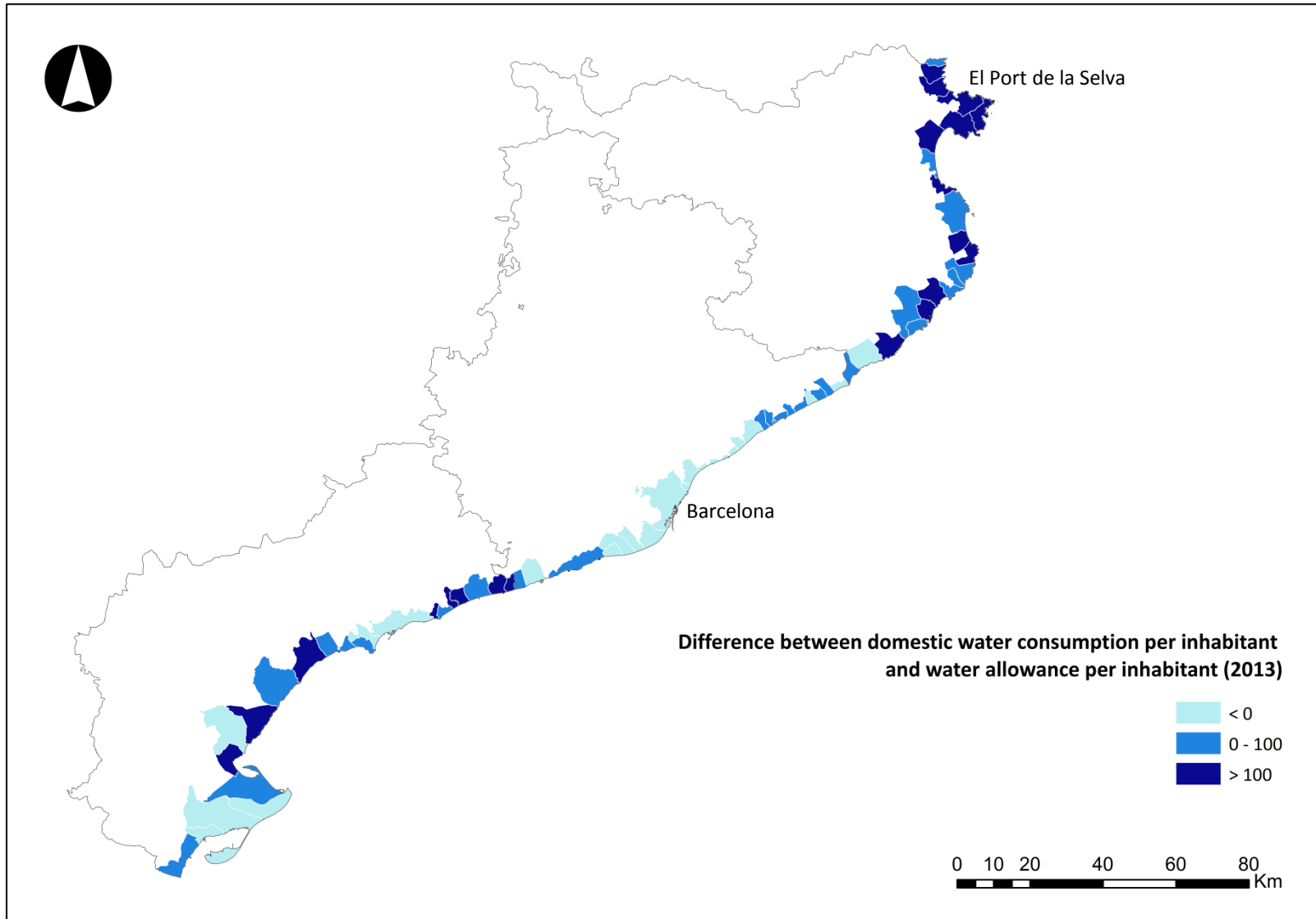
$$\textit{Basic population} = \textit{Permanent population} + 0.4 \cdot \textit{Seasonal population}$$

Weighting system for calculating **seasonal population**:

- 4 persons/secondary residence
- 1 person/hotel bed
- 1 person/pension bed
- 2.5 persons/camping unit
- 1 person/other types of accommodation



Results I. Comparison among indicators



Methodology II. Variables

Dependent variables

- Domestic water consumption per inhabitant per day (2011, 2012 and 2013)

Independent variables included

- *Gross income per inhabitant* (2010)
- *Urban density* (2012 population over the urban area of 2006)
- *Aging index* (2011)
- *Household size* (2011)
- *Percentage of secondary residences* (2011)
- *Percentage of foreign population* (2011)
- *Domestic water price* (2009 and 2013)

LINEAR
REGRESSION
+ STEPWISE

Independent variables not included

	Yes	No	Not available	Total
<i>Water saving ordinance</i>	7	62	0	69
<i>Local Agenda 21</i>	53	8	8	69
	Public	Private	Mixed	Total
<i>Typology of water supply management</i>	6	55	8	69

Results II-A. Linear regression model

Dependent variable: domestic water consumption per inhabitant per day in 2013

Independent variables	Pearson Correlation Coefficient	Significance (unilateral)
<i>Domestic Water Price 2009</i>	-0.200	0.078
<i>Domestic Water Price 2013</i>	-0.299	0.016
<i>Urban density</i>	-0.635	0.000
<i>Aging index</i>	0.116	0.206
<i>Gross income per inhabitant</i>	-0.007	0.480
<i>Household size</i>	-0.357	0.005
<i>% of secondary residences</i>	0.818	0.000
<i>% of foreign residents</i>	0.514	0.000

Average water consumption 2013 = 223.48 l/inhab./day; N = 52, R = 0.845, R² = 0.715

Results II-B. Stepwise analysis

- The choice of predictive variables is carried out by successively adding or eliminating variables according to the t-test statistics of their estimated coefficients.
- N is relatively small. (N=69)

Chosen independent variable: percentage of secondary residence

Dependent variable	Independent variable	Coefficient	t	Sig.	R	R ²
2013 water consumption	% of Secondary Residences	0.844	10.427	0.000	0.844	0.712
2012 water consumption		0.804	9.554	0.000	0.804	0.646
2011 water consumption		0.802	9.504	0.000	0.802	0.644

Discussion and Conclusions

- In coastal municipalities, the **ACA's allowance indicator** proves to be a useful tool to better reflect water consumption taking into account **the seasonal population**.
- The **social**, and specially, the **territorial factors** analysed are responsible of the variation in domestic water consumption per inhabitant;
- Somehow surprisingly, **the economic factors do not appear significant**.
- A detailed study is needed on what are **the implications of tourism (expressed in terms of large seasonal populations) for local water management** and what would be the more **efficient** (but also **fair**) tools to improve this management.
- Replicate methods to the entire study area as **data** become **available**



Thank you for your attention!!

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GRATS – Dept. of Geography – Autonomus University of
Barcelona (UAB) & Internet Interdisciplinary
Institute (IN3; UOC)

<http://geografia.uab.es/grats/>