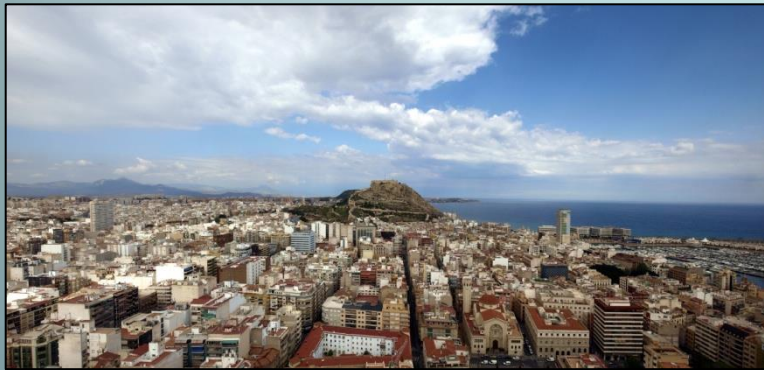


THE HIDROSOCIAL CYCLE IN THE CITY OF ALICANTE: NEW TRENDS AND CHALLENGES

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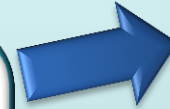


1. INTRODUCTION: THE CONCEPT OF HIDROSOCIAL CYCLE

- **The relationship water-urban development** is basic to explain the dynamics of cities throughout history.
- Urban development involves **a growing mobilization of water resources**, while the development of the latter stimulates the expansion of cities.
- Through this dialectic, the **urban cycle of water**, from supply to sewerage, **becomes increasingly complex** and in its dynamic **economic, political and social factors** come to occupy a place of great importance together with the **more natural components**.
- The **hydrological cycle** happens to become a **hidrosocial cycle** in which water flows become "**power flows**" (Swyngedouw)
- It is necessary to give empirical content to this line of argument with case studies such as **that presented next**.

2. WATER AND URBAN DEVELOPMENT IN ALICANTE: THE HIDROSOCIAL CYCLE UNTIL THE END OF THE XX CENTURY

❑ Territorial area (**South-east of Spain**) conditioned by **aridity** (annual rainfall rarely exceeds **350 mm**)

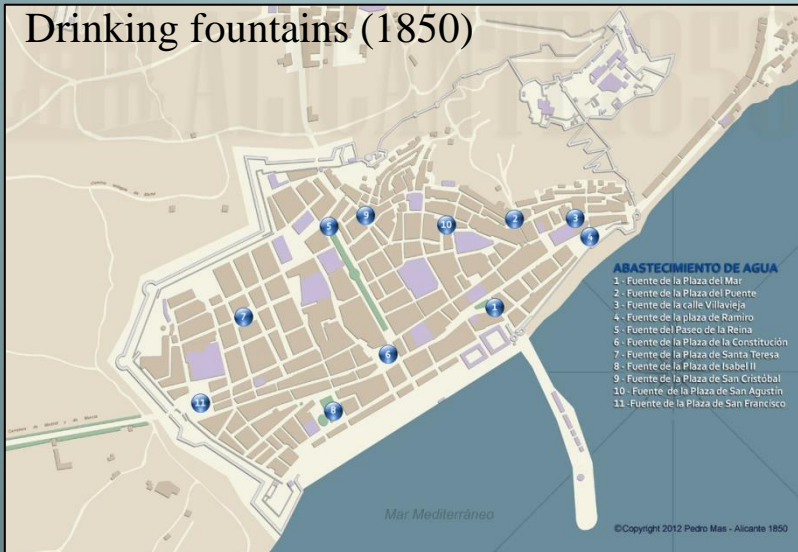


It **constraints** (but also **enables**) economic activities and growth of the city

- ✓ drinking fountains
- ✓ springs
- ✓ wells

**Local
water
resources**

Drinking fountains (1850)



Source: Pedro Mas (http://www.alicante1850.es/?page_id=948)



Initiatives to increase water resources

✓ 1860:

- “Pozos Garrigós” (wells)
- Wells from Alcoraya (16 km)

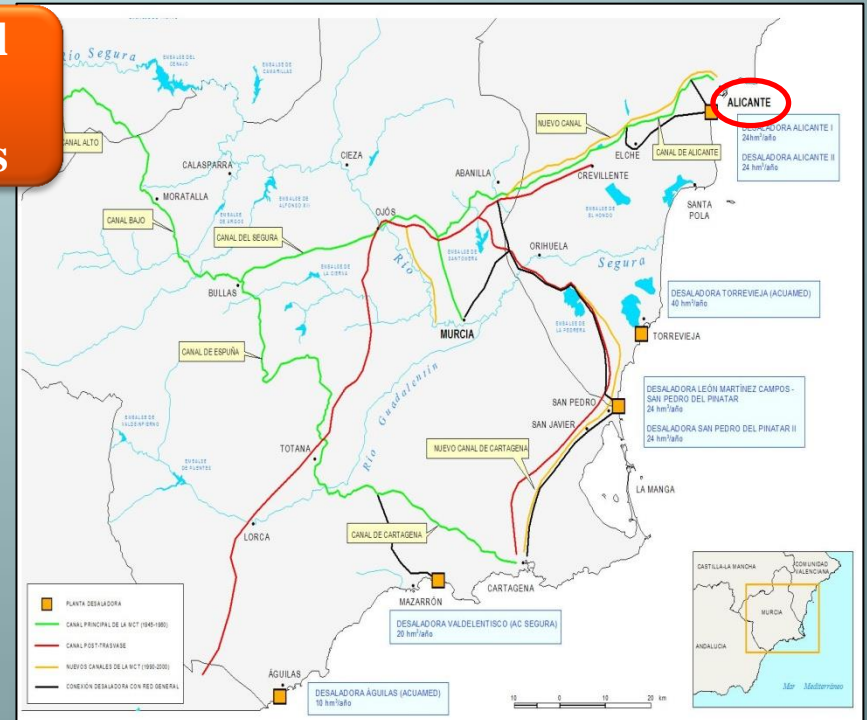
✓ 1898: aquifers from Alto Vinalopó (55 km):

- Canal del Cid
- *Société Anonyme des Eaux d'Alicante* (company)

✓ 1958 Joined the Mancomunidad de los Canales del Taibilla (MCT): “canal de Alicante”

- river Taibilla (204 km)
- river Tajo (1979) (transfer Tajo-Segura) (390 km)

Non local water resources

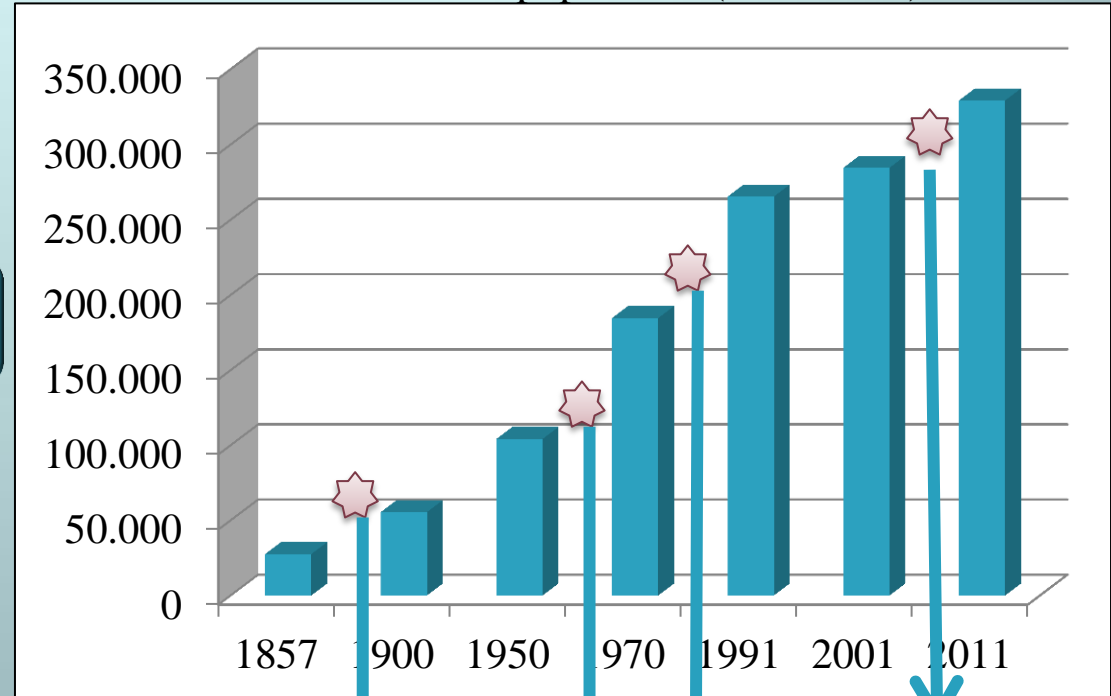


3. URBAN DEVELOPMENT AND WATER RESOURCES IN ALICANTE (2000-2013)

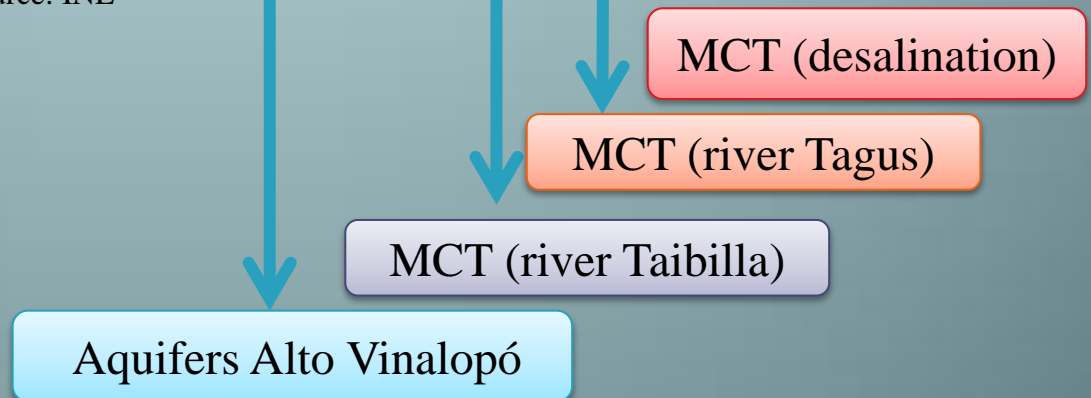
3.1. Defining factors

☐ increase of population

Evolution of population (1857-2011)



Source: INE



❑ Increase of population

❑ Strong urban growth / **burst of real estate bubble**

- urban model with outdoor uses



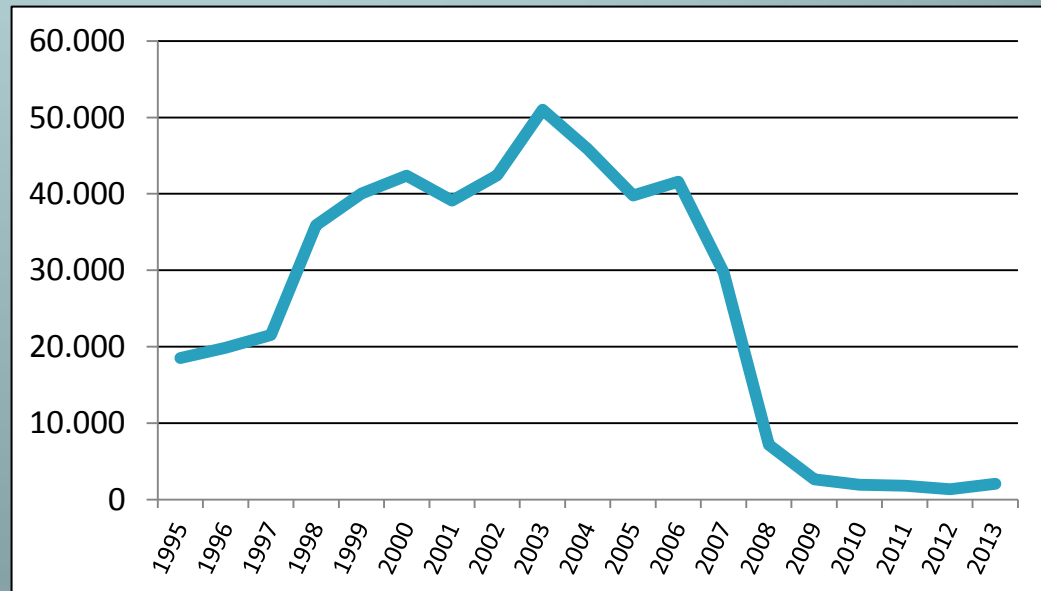
	New dwellings units	Built surface (m ²)	Population 2011	% new dwelling units/ national total	% population / national total
ESPAÑA	5,668,047	931,758,647	47,212,990	---	---
Alicante	345,410	50,995,114	1,940,956	6.09	4.11

Nº of certified dwelling and built surface (2000-2011)

Source: INE

Evolution of certified dwellings in Alicante province (1995-2013)

Source: Ministry of Public Works



3.2. The hidrosocial cycle (2000 -2013)

- a) **demand:** from an **increase trend** (1997-2004) to a **decrease of consumption since 2004**)

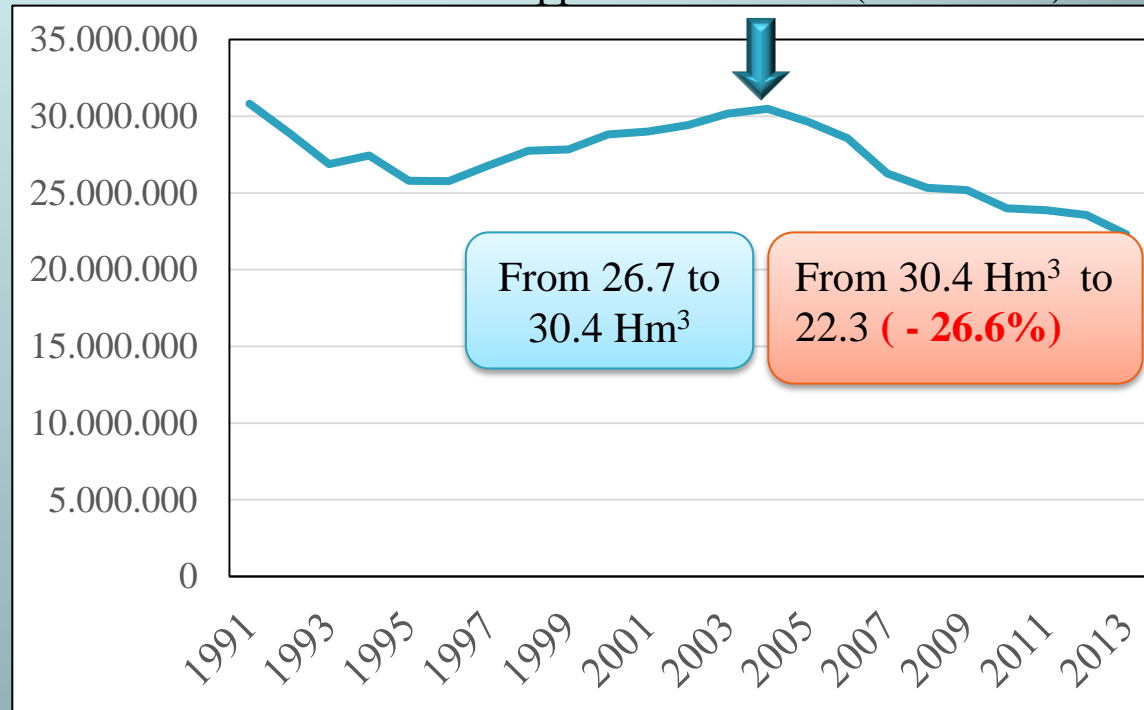
Causes:

- economic development
- recovery of consumption after drought of mid 90s

Causes:

- structural factors: technological advances, devices saving appliances and faucets, awareness-raising campaigns, prices and taxation,
- contextual factors: economic crisis, burst of real estate bubble, slow population growth, lower occupancy of secondary residence

Evolution of water supplied in Alicante (1991-2013)



Source: AMAEM

b) **Origin of water resources (demand):** changes in % of origin & a new resource

➤ 2000: 28,8 Hm³

• MCT: 79,8%
• AMAEM: 20,8

• Bottled water: 31.287,8 m³

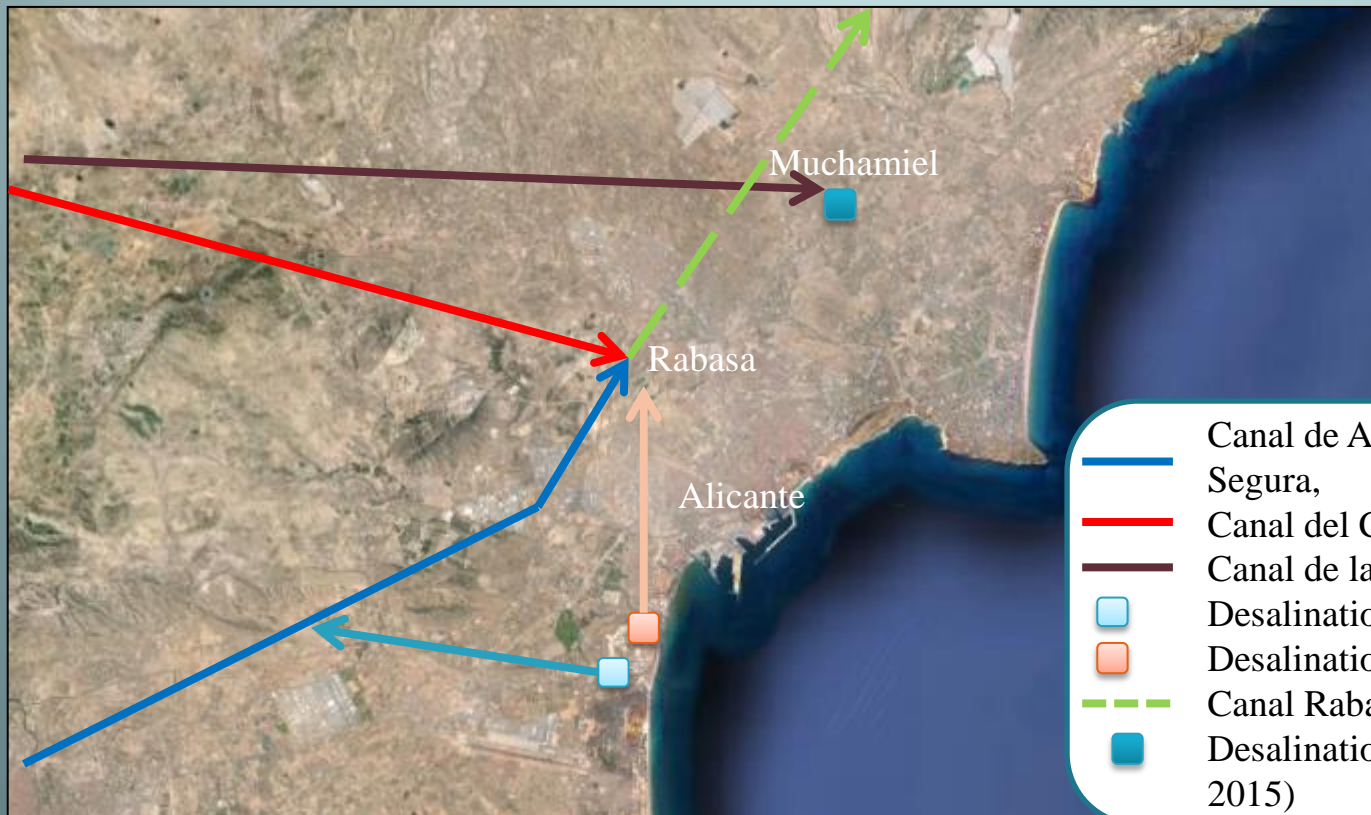
➤ 2013: 22,3 Hm³

• MCT: 91,52%
• AMAEM: 8,47%

• bottled water: 37.860 m³

• 88,11% Tajo & Taibilla
• 3,41% Desalination

Decreasing
volume between
2007 and 2013



— Canal de Alicante (MCT): ATS, Taibilla & Segura,
— Canal del Cid (AMAEM: acuíferos)
— Canal de la Huerta (AMAEM acuíferos)
□ Desalination plant (Alicante I, MCT, 2003)
□ Desalination plant (Alicante II. MCT, 2008)
--- Canal Rabasa-Fenollar (C. Marina Baixa)
□ Desalination plant (Mutxamel, Acuamed, 2015)

c) **consumption:** decreasing **except municipal uses**

2000: 23.7 Hm³

- **domestic: 15.6 Hm³ (65.8%)**
- commercial activities & services: 5.2 Hm³ (21.9%)
- municipal: 2.9 Hm³ (12.2%)

• 1 / inhab/ day: **152**

2013: 20.7 Hm³

- **domestic: 14.5 hm³ (70%)**
- commercial activities & services: 3.3 hm³ (15.9%)
- municipal : 2,9 hm³ (14%)

• 1 / inhab/ day: **119**



AYUNTAMIENTO DE ALICANTE

d) **SEWERAGE SYSTEM: 2 treatment plants: tertiary system**

- **Rincón de León** (1981, extended in 1996): 75,000 m³ (project capacity)
- **Orgegia** (1985, extended in 2005): 60,000 m³ (project capacity, only 30,000 in winter)

Sewage treatment
/ re-use

Since mid 90s

- agricultural uses,
- garden irrigation (public)
- golf course

EDAR	Hm ³ sewage / reused
Rincón León	29,23 / 9
Orgegia	8,36 / 6

Alicante / outside
areas

Sewages water and reuse (2005)

Source: EPSAR



- continuity of sewerage system

- New inputs

2002: regenerated sewage water for irrigation garden (private & Public)

increased use (irrigation garden)

- replacement of white water
- more convenient price: **0,32 € /m³** (1/5 white water)

Evolution of regenerated sewage water consumption

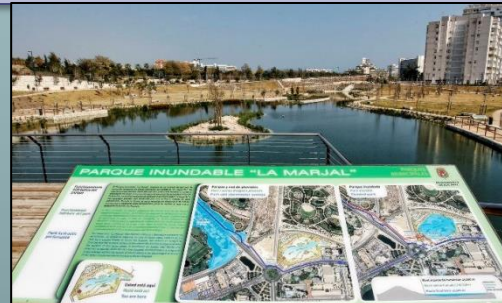
	Total (m ³)	Municipal	Private
2002	39,358	39,358	0
2007	432,247	171,990	260,257
2013	1,050,063	587,357	462,706

Source: AMAEM



2 new infrastructures (avoid collapse water treatment / minimize flooding)

- 2011: San Gabriel anti-pollution tank (capacity 1.1 Hm³)
- 2015: Park la Marjal (San Juan): capacity 45,000 m³



e) Social effects of consumption trend & new resources

▪ **rising** water prices

Incorporation of desalinated water

Increase of taxes

between 2000 and 2013:
the water bill has
increased by **77%**

DOMESTIC USE (Price provided by MCT to municipal companies):

- 2005: **0,31** € /m³
- 2008: 0,51 € /m³
- 2013: **0,70** € /m³

- consumption reduction
- **exclusion for certain social groups**

	2000	2013	% growth 2013-2007
Water			
• Service fee	10,98 €	21,96 €	100,00
• Consumption (30 m ³)	9,17 €	11,31 €	23,33
Maintenance counter	1,32 €	1,71 €	29,54
Sewage			
• Service fee	2,36 €	4,56 €	93,22
• Consumption	1,62 €	1,65 €	1,85
Sewage tax			
• Service fee	4,40 €	9,89 €	124,77
• Consumption	5,21 €	11,67 €	123,99
VAT	2,69 €	4,31 €	60,22
Total	37,75 €	67,06 €	77,64

f) “power flows”: **continuity** with small changes

Water supply



Public system / join venture



**Water
management
& distribution**



join venture



**Sewarage
systems**



Public system



**Management of
regenerated
sewage water**



join venture



4. CONCLUSIONS

- The hidrosocial cycle in the city of Alicante shows over the past decades the typical dialectic between water and urbanization.
- Urban growth has been accompanied by the mobilization of more distant resources (wells in Villena, MCT, transfer river Tagus-Segura).
- Incorporation of non-conventional resources (desalination) to make possible the most intense phase of the real estate bubble of the 2000s.
- This cycle is also interesting to analyze the behavior of the hidrosocial cycle during economic crisis and urban decay.
- Increase of social inequalities in access to water (prices) and slowdown of the urban metabolism without consequences (for the moment) in the geometries of power.
- Unlike that in other cases (Barcelona), crisis and the slowdown of the economic phase has not behaved changes in controlling hydrosocial cycle.